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## BRIEFLY TOLD.

MR. VANDERPOOL PLEADS NOT GUILTY.—In its issue for the 1st inst., the London *Journal* printed the following: "At the recent congress of the *Societe Technique*, the first prize of the Society (3,000 francs) was awarded to Mr. Eugene Vanderpool, President of the Newark (N. J.) Gas Company, for his paper on ventilation by gas." At the time of reading this announcement we were rather surprised that the President-Engineer of the Newark Company kept the fact that he had prepared a paper for the last meeting of the French Association of gas engineers so strictly to himself. Nor do we wish to be understood as hinting that Mr. Vanderpool could not prepare a paper on the subject of ventilation by gas that would be well worthy of the Association's first prize. Indeed, we are certain that any compilation by him would be on the order of first merit. However, Mr. Vanderpool does not wish to seem to wear a wreath woven for some one else, and the following letter from him explains it all away, in so far as a disclaimer may:

"OFFICE OF NEWARK GAS LIGHT COMPANY,
NEWARK, N. J., July 14, 1890.

"To the Editor AMERICAN GAS LIGHT JOURNAL: So that the error may not be extended, I write to say that the statement in the London *Journal of Gas Lighting*, of July 1, to the effect that the Societe Technique de l'Industrie du Gaz en France awarded me the first prize for a paper on ventilation by gas, must be a mistake, as I did not write the paper. I am sorry that so great an honor does not belong to me; but as I have not done the work, I am not entitled to any reward.

Yours very truly, EUGENE VANDERPOOL."

No doubt this odd mistake is traceable to the fact that such a prize for such a paper was awarded to M. Vanderpol, possibly of Lyons, France, who recently became a member of the French Association. We can only repeat that the honor was not really and fairly the portion of "our Vanderpool;" more's the pity.

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THE LATEST BIDS FOR ELECTRIC LIGHTING, NEW YORK CITY.—Last Monday the Gas Commission of this city opened the bids submitted by the various electric lighting companies in response to a second invitation to supply the city with electric arcs on public account. The number of lamps asked for was 890. The bids are as follows: United States Electric Lighting Company, 236 lamps, at 35 cents per night, up to January 1st, and 43 cents per night from that date to April 23d, 1891; the Brush Electric Illuminating Company, 169 lamps, at 35 cents to January 1st, and 43 cents to April 23d, and 69 lamps at 45 cents; East River Company, 189 lamps at 35 cents to January 1st, and 45 cents thereafter; Harlem Electric Lighting Company, 104 lamps at 35 cents and 45 cents. It is quite likely that the Commission will reject these bids, or at least a considerable percentage of them, and order a return to gas.

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TURPENTINE WILL ANSWER THE PURPOSE.—A correspondent who signs himself "Texas," writes: "Will you kindly inform me of any oil or acid which, mixed with coal tar, will keep it from being melted down by the heat of the sun, when placed on a metal or shingle roof? Also, in what proportions to mix?" Ordinary turpentine of commerce will likely answer the purpose satisfactorily. The conditions of temper-

ature and the material over which the mixture is to be spread must determine the quantity of turpentine that should be added. In a climate like that of Texas such applications would be followed by the best results as to permanency when made during cool weather.

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Rejection of the Nomination of Commissioner Rowell.—From a semi-official source we learn that Gov. Brackett recently sent in to the Executive Council the name of Edward T. Rowell, of Lowell, Mass., to succeed himself as a member of the Board of Gas and Electric Light Commissioners of the State of Massachusetts, and that the Council rejected the nomination by a vote of 5 to 4. While not at present in position to discuss intelligently the action taken, we cannot forbear from expressing our sincere regret that Mr. Rowell was not returned to the office, the duties and responsibilities of which were performed and sustained by him with thoroughness, impartiality and dignity. We hope to be able to speak at length on this matter next week.

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Judge Brown Decides against the Brush Company.—A case that has attracted much attention in Western electrical circles is that of the suit for an injunction brought by the Brush Electric Light Company to restrain the Detroit Electric Light and Power Company from employing towers similar to those used by plaintiff. The proceedings were had before Judge Brown, who, according to a local authority, "handled the question without gloves," and there was little consolation for the Brush Company in the opinion, which was delivered off-hand. All their five claims of infringement were denied, with the exception of the central pole as a support for the skeleton tower. This the Judge thought might be patentable. Coming down to the question of granting or denying a preliminary injunction, the opinion was substantially as follows: "I think upon the whole that a preliminary injunction in this case ought not to be granted for the following reasons: First, because I am not altogether certain that the central post is patentable, or, if patentable, that it is infringed, although my present impressions are in favor of complainants upon both those points, but I can conceive it entirely possible that upon a more elaborate hearing of this case other devices may be shown which were anticipatory of this; or I may be able to sit in connection with the Circuit judge, as this is a matter of considerable importance, where I should not hesitate to call upon him, as his opinion may differ from mine in regard to it. Although, as I said before, if this were a final hearing I should feel compelled with the doubts I entertain about this case, to grant this injunction and not to accept a bond. I merely throw out this intimation as a hint to the defendants to accommodate themselves to the possible final disposition of this case. In the second place, I do not think this court ought to use the process of an injunction to break up this contract. I think the court ought rather to favor the contracts into which the municipality has entered, and not use the process of the court to break them down. In the third place, the granting of an injunction in this case would lead to very serious consequences, which would result not merely in the discontinuance of this central post, upon which, as I conceive, this whole case depends, but it would involve the stoppage of the use of the entire tower and the lamps placed upon that tower. At the same time, if this were a patent upon the lamps, and I felt as clear as I do about the question of central post, I should not hesitate to grant the injunction asked; or if it were upon the tower itself, I should make a like disposition of the case; but as it merely involves the support of the tower, and as the use of those supports in itself does no damage to the complainant, I think it would be an oppressive use of the process of the court to put a stop to the entire lighting of the city by this defendant company, simply because they have used, in defiance, it may be, a post which is an infringement upon the complainants' patents. Now, what shall be the result of this case upon a final hearing? The defendant may, undoubtedly, as it seems to me, avoid the effect of this patent by extending his parallel posts to the ground. And that form of it, I presume, may be done in a large number of cases. But, I suppose, he does not see fit to do that, and it would be a question of consideration whether we would enjoin him. I can only say that my present impressions are that if the case stands as it now does on final hearing, I shall be obliged to grant an injunction. I think, however, it is open to a fair argument as to whether this does involve invention, or whether this device is an infringement, and upon the whole I have come to the conclusion to deny the injunction.

"Both sides will be allowed three months in which to prepare for the final hearing on the question of whether the central post is patentable, and an infringement on the patent controlled by the complainants."

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Notes.—A. H. Dugan, who resides on Washington street, between Hancock and Jackson streets, Louisville, Ky., has sued out an injunction against the Louisville Gas Company, temporarily restraining the latter from constructing a stable on premises owned by the Company and adjoining the Dugan property. Dugan alleges that such action would largely depreciate the value of his premises as a place of residence.——The Boston *Sunday Herald*, of the 13th inst., says that the Directors chosen to manage the American Gas Investment Company (which is the successor of the United Gas Improvement Company) are Messrs. Stephen A. Caldwell, President of the Fidelity Trust Company, Philadelphia; J. Edward Addicks, President of the Bay State Gas Company, of Boston; W. W. Gibbs, President United Gas Improvement Company, Philadelphia; A. Belmont, Jr., of August Belmont & Co., of New York; Samuel T. Bodine, of Philadelphia; W. E. L. Dillaway, of Boston; Thos. Dolan, of Philadelphia; W. L. Elkins, Philadelphia; Eustace C. Fitz, of Fuller, Dana & Fitz, Boston; Henry C. Gibson, of Philadelphia; H. B. Hollins, of H. B. Hollins & Co., New York; Emerson McMillin, President Laclede Gas Company, St. Louis; Edmund H. McCullough, of Westmoreland Coal Company, Philadelphia; Randal Morgan, Philadelphia; George Philler, President First National Bank, Philadelphia; Augustus G. Richey, Trenton, N. J.; W. H. Thompson, President Bank of Commerce, St. Louis; Edward Tuck, New York; W. G. Warden and P. A. B. Widener, Philadelphia; and Fred. W. Whitredge, of Curry & Whitredge, of N. Y. A strong combination, surely.——Messrs. Eggleston & Hammond, as attorneys for T. W. Haymond, administrator of the estate of the late Chas. Hanley, of Terre Haute, Ind., have brought suit against the Terre Haute Gas Light Company for $5,000 damages. Complainant alleges that Hanley, who was suffocated by gas, lost his life through the negligence of the Gas Company in not keeping its mains in repair.——The National Electric Manufacturing Company has just closed contracts for electric lighting plants at Wilson, N. C., and Rock Hill, S. C. At the former place the plant is to be installed at the Wilson Cotton Mills, while at the latter a regularly organized Company will carry on a general business.——Manager Stocum, of the Tonawanda (N. Y.) Gas Light Company, informs us that he will put down this year about 3 miles of street mains. He is also putting in a new bench (5's) of retorts, and has placed 105 street lamps.——According to the report of Director Wagner (Philadelphia Bureau of Public Works) for the six months ended June 30th last, it seems that the quantity of gas manufactured at the city gas works during the first half of 1890 was 1,665,157,000 cubic feet, a decrease of 286,210 cubic feet as compared with the corresponding period of last year. On the other hand, 925,222 000 cubic feet were purchased from the Improvement Company, an increase of 413,231,100 cubic feet over that bought in the first half of 1889. The increase in the sendout for the six months is 127,021,000 cubic feet. The Bureau receipts for the first six months of 1890 were $2,246,935, an increase of $13,924 over last year. The expenditures were $1,367,512, a decrease of $103,860.

## The Market for Gas Securities.

The dull summer period is fairly on us now in respect to dealings on the exchange in gas shares, although there is more or less demand for this class of securities. Consolidated is firm at 101 bid, and in our opinion it is decidedly a purchase at that figure. It is much more than an even chance in favor of a raise in the next dividend to 3 per cent., which ought to carry the shares to 110. Mutual is in demand at hardening figures, and we expect that purchasers would have to offer 127 before a trade in it could be made. Equitable also keeps on advancing. In Brooklyn shares the advance has been very material. For instance, Nassau is at 136, Williamsburgh, 131, Fulton Municipal at 144, Brooklyn, 120, Citizens, 83, Metropolitan, 110, ex, and Peoples, 93 to 95. These figures are very suggestive. Mr. B. F. Sherman has instituted suit in the Supreme Court against the Beacon Construction Company to recover certain sums said to be due him out of the profits made in the famous Boston gas works (or Bay State) deal.

The proposed plan for the settlement of the gas war in Memphis has fallen through, the old Memphis Company not finding the details of the truce arrangement submitted by the Equitable folks quite to its liking.

Taking the situation as a whole, it can be safely said that the outlook for gas shares as to stability and worth, never was more promising. We have a reported sale at auction in this city last week of $23,000 first mortgage, 6 per cent. gold bonds, of the Saratoga (N. Y.) Gas and Electric Light Company, at 93. The bonds are due in 1907, and the interest dates are February and August. We understand that Gov. Brackett has named the Hon. Mr. Chas. A. Towne, to succeed ex-Commissioner Rowell, on the Massachusetts Board of Gas and Electric Light Commissioners.

[Prepared for the JOURNAL.]

## Municipal Gas Lighting.

By A CITIZEN.

From the attention paid to this subject in the last few months, and the numerous papers written on it for the various conventions, it would appear that the tendency toward the absorption of the gas industry by the different municipalities has created some alarm among the fraternity. Naturally, the project finds few, if any, friends in the business; but the arguments on the subject will vary according to the source from which they come. Thus the stockholders, who, by a wise selection of capable men for offices, have built up a business on a substantial basis, and are satisfied with their returns, and the safety of their investment, will, of course, oppose any scheme leading to a surrender of their property.

On the opposite side are the grand armies of politicians, great and small, chronic feeders at the public crib, who see in the public administration of the business in question—more opportunities for a division of the spoils and payment for services rendered at elections. Another party interested in the subject is the consumer, who, holding fast his ancient prejudices against gas companies in general, sees in the change a possible reduction of his bills, and the total discomfiture of his old-time enemy.

What the result would be, if the gas and electric business in the city of New York were delivered over to the municipal authorities, no one conversant with existing facts can doubt. Without question, any one of the different municipal departments could be better administered at a saving of at least one-third of the present cost.

The faction in possession at present, whose motto is "To the victors belong the spoils," would hail with delight a change by which their peculiar field of official robbery would be greatly enlarged. It is argued by some that the reasons why a city should control and administer the departments of health, fire, police, water supply, street cleaning, charities, etc., apply equally to the supply of light.

This would be the fact if the public lighting only is considered; but private lighting is an entirely different matter, and the use of the streets for mains and services does not affect the subject any more than the use of the streets by public hacks, railroad cars, etc., affects the private ownership of those industries. It is right and proper that those who use the public streets should pay a proportion of the cost of paving, and it is proper that gas companies should be compelled to repair the streets after they have torn them up.

A paper on this subject, stating the facts clearly and in a very able manner, was read by Mr. Herman Wilkiemeyer, at the late meeting of the Ohio Gas Light Association. He says: "The *rationale* of the construction of the social fabric precludes the exercise by the municipality of all functions but those that are police in their nature and tendency. Wherever a departure from this rule occurs then liberty suffers, and another item of natural personal liberty is sucked into the great vortex of centralization of power. It is, therefore, wrong, on first principles, for a city to engage in any other occupation or business than that for which cities or communities or society was originally established.

"The centralization of affairs in the Government is eminently unwise, for there is no limit to the venture. If the city has an inherent and politic right to go into the lighting business, it has also the right to go into the coal, clothing and grocery business. * * * By absorption of all business the Government would become parental in its nature. Ambition would have no place in our makeup, and we would be a nation of nonentities. * * * The question of the advisability of a city's owning and operating a gas light or an electric light plant is preeminently an economic and practical one.

"It may safely be laid down as an axiom, that whenever a city embarks in any venture that even savors of money-making it is exceeding either its legal powers, or is encroaching upon rights never ceded by the people.

"Looseness and carelessness are almost inevitable in the management of a city lighting plant."

The temptation to quote further from this excellent paper is great, but space will not permit.

In the *Century Magazine*, for March, 1890, is an exhaustive article, by a writer who is enthusiastic on the subject of municipal control, which, under the title of "Glasgow, a municipal study," touches incidentally on the subject of municipal gas lighting in that city.

From this article it appears that the city controls the following industries, in addition to those usually under municipal control, viz.: model lodging, and tenement houses, public bath houses and laundries,* water supply, street railways, public markets, slaughter houses and gas supply.

In regard to the last mentioned, the writer says: "In the year 1869, after much difficulty in adjusting the details of the arrangement, the gas supply was transferred from private hands to the corporation, to be managed by the council as an ordinary department.

"The original cost was $2,600,000. Twenty years of management by the authorities has given unmitigated satisfaction to all the citizens of Glasgow." (This statement throws a cloud of doubt over the whole article in question. That a gas company, public or private, could give satisfaction and unmitigated satisfaction at that, is an impossibility. The chronic kicker is not easily extinguished.)

"The quantity of gas sold has increased from 1,036,000,000 feet, in 1869–70, the corporation's first year, to 2,427,000,000 feet in 1877–78, an increase of 140 per cent., while the population has grown only 20 per cent.

"The amount of gas unaccounted for in 1869–70 was 20 per cent. Careful management has reduced this amount of leakage to about 10 per cent.†

"More than 130,000 meters are in use, and as it is not the policy of the corporation to *charge its customers for more than they actually consume*, it is inevitable that there should be a considerable percentage of loss in delivery. (From the portion of the above which I have put in italics it seems that our author must at some time have been a kicking consumer himself.)

"From $1.14 per thousand feet, charged for gas in 1869, the corporation has been able to make reductions year by year, until, for 1888–89, the price was fixed at 66 cents. No one will claim that a private company would have made these reductions, while continuing to supply a satisfactory quality of gas." (The chronic kicker knows it to be a fact, that a gas company always reduces the quality when it reduces the price.)

"A peculiar feature of public illumination by the city of Glasgow is stated as follows:

"The authorities some years ago entered upon the policy of lighting private courts and passages as well as public streets, and further undertook the lighting of all common stairs in tenement houses. The stair-lighting costs the city more than the lighting of all the streets, counting wages and gas. It should be said the expense of stair-lighting is partly met by special assessment."

Granting, for argument's sake, that everything connected with municipal gas lighting in Glasgow is as rosey-hued as this writer states, on an investigation of his paper we find a reason for it in the very different class of office holders there from what we have in this land of universal suffrage, which, however good in theory, is very bad in practice.

He says: "In considering the effect of the franchise upon the city government, it is to be borne in mind that not only is the mass of unmarried workmen excluded, but also all others who have failed to pay their rates. This is a point of enormous importance, for I have ascertained that in Glasgow last year no less than 25,000 householders were disfranchised by reason of non-payment of assessments.

"About one-third of the householders * * * * fail to pay their rates and never vote. If it was possible to secure re-instatement by payment of arrears as an election approaches, there would be a tempting field of activity opened up to corrupt politicians. But this cannot be done.

"The better class of workmen in Glasgow of course pay their rates, take an active interest in public affairs and do not fail to vote; but there is a very large population, of the degraded poor, which does not in fact participate in elections and is not of the slightest service to 'ward politicians,' a genus which, by-the-way, is rarely found in British cities. What I may call the self-disfranchisement of the slums is an important consideration in Glasgow municipal government.

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*It may interest the reader to know that he can have his washing done, by the city corporation of Glasgow, at about the current Glasgow rates. He also adds: "This rather undignified entrance of the municipal corporation into competition with the private laundries of the city can hardly find permanent favor; but this is merely incidental, and it detracts nothing from the praiseworthiness of the public services rendered by the baths and wash houses."

†This statement is also subject to doubt, as to its accuracy, as the following table, from Field's Analysis of British gas lighting of recent date, shows that the gas unaccounted for per mile of main exceeds that of any other company quoted.

| Name of Company. | Gas sold per mile of Main. | Gas Unaccounted for per mile of Main. |
|---|---|---|
| Gas Light and Coke Company | 9,219,000 cu. ft. | 580,000 cu. ft. |
| Commercial | 6,806,000 " | 482,000 " |
| So. Metropolitan | 7,110,000 " | 365,000 " |
| Birmingham | 6,411,000 " | 417,000 |
| Leicester | 7,198,000 " | 282,000 |
| Manchester | 4,258,000 " | 290,000 " |
| Glasgow | 9,972,000 " | 1 370 00 |

"The Councillors of Glasgow come chiefly from the ranks of business men, and are respected and successful citizens. No salaries are attached to such offices, and it is deemed an honor to be selected to represent one's ward. Heads of departments are selected with great care, and their places are practically permanent."

In glaring contrast to this class of managers of municipal gas lighting would be the officers in charge of the gas supply of New York, where two-thirds of the aldermen are interested in gin mills, and all of whom hold office for personal greed. What rich openings would be discovered for swindling in the purchase of coal and in the sale of residuals! In fact, our city government has become a by-word and a synonym for all that is bad, and there are no signs of reformation. A late writer sums up the matter in these words: "Thus it has come to pass that * * * * we have developed the monstrosity of a perverted government; a government not of the best, but of the worst; not of the noble, but of the ignoble; not of the educated, but of the ignorant; not of the virtuous and God-fearing, but of the vicious and the criminal."

A few of our American cities have adopted the system of municipal gas lighting—viz., the cities of Philadelphia, Pa.; Richmond, Charlotteville, and Alexandria, Va.; Hamilton and Bellefontaine, Ohio; and others.

In Philadelphia a portion of the gas supply is purchased from a private company, which fact is a positive proof that a private company could sell gas to the consumers at a less rate than the city authorities can.

In the case of the city of Hamilton, Ohio, the city has established a plant for lighting the city with gas, and the Supreme Court has decided that the gas company has no rights which the municipality is bound to respect, in the matter of competition; and this in face of the fact that the same authorities may dictate and enforce the price to be charged by its competitor. If this example of Russian administration should be generally followed, the gas companies may well feel interested in the subject.

The question of municipal lighting having been brought before the Legislature of Massachusetts, a committee from that body visited the gas works in several cities. The committee, in its report, considered it inadvisable to recommend the adoption of municipal control of gas and electric lighting in that State. Speaking of the situation in Richmond, Va., the committee said: "It is evident that a limited number of citizens are paying a high price for gas without corresponding advantages to the city."

The Legislature also applied to the Attorney-General of the State for his opinion in the matter. Extracts from his reply (see AMERICAN GAS LIGHT JOURNAL, May 26, 1890, p. 738), are as follows:

"Towns, upon general principles as municipal corporations, have no power to levy taxes and assess money upon the inhabitants for general or indefinite purposes, but only so far as the same may be necessary to enable them to exercise the powers, enjoy the privileges and perform the duties established as before intimated.

"I can find no law or statute by which towns have been authorized to enter into business of a commercial or private nature, such as requires an investment of capital, and the employment of skilled labor or scientific knowledge therein. And I am of the opinion, for the reasons above stated, that under the existing statutes towns have no authority to construct and maintain within their own limits, and for their own use, systems of lighting by gas or electricity; nor can they, in connection with such systems, sell gas or electricity for private use in such towns."

He also states the same rules apply equally to cities as well as towns.

The Legislature having refused to accept this construction of the laws as final, appealed to the Supreme Court of the State for an opinion on the same question.

Briefly stated the opinion of the Court is this, as to the question whether a city or town has the right to supply light for public use: "If they have the right to buy they also have the right to manufacture light."

As to the question of selling light to private parties:

"The furnishing of water for cities and towns for domestic use affords perhaps the nearest analogy to the subject. Water cannot ordinarily be supplied to a large city or town from ponds or streams without the exercise of the right of eminent domain, and the use of public ways, * * * therefore the furnishing of water has been considered a public service."

The weak point in this opinion is the assumption that gas or electric light is a necessity, as water is. Continuing, the Court says: "Artificial light is not so absolutely necessary as water, but it is necessary for the comfortable living of every person. Although artificial light can be supplied in other ways than by the use of gas or electricity, yet the use of one or both * * * is common." (The opinion can be read at length in the AMERICAN GAS LIGHT JOURNAL, of June 9th, 1890.)

When judges disagree who shall decide? We believe that the matter was left undecided at the adjournment of the Legislature.

The subject has thus far been considered from the standpoint of a resident of this city.

Perhaps other cities have good governments and honest city officials who accept office for the public good and not for personal greed. If there are any such officials, it would seem to be the fact that they would be honest enough to see that they had no more right to sell the citizens light than they had to sell beef in opposition to the honest butcher, or to set up a laundry and ruin industrious John from China.

There is no doubt that the work of several of the departments now controlled by the city authorities could and would be better done by private corporations. This city pays an enormous sum yearly for street cleaning, but it has the name of being very near the head in a list of the dirty cities of the world. Some streets are models of cleanliness. Why? because they are cleaned by contractors paid by the residents themselves. Comment on this fact is superfluous. Another fact: Millions of gallons of water are wasted every year. Is it to be supposed for an instant that this would be allowed by a private corporation? The waste would be done through a meter, duly recorded and paid for.

To sum up the matter of municipal gas lighting, and viewing the whole matter of municipal government from the standpoint of common sense and reason, it seems plausible that certain departments should from their very nature be administered by the municipality. These departments are for the most part of a police nature, and are for the enforcement of the laws, and for the general protection of the city from fire, epidemics, lawlessness, etc., such as the departments of police, fire, health, charities and corrections.

The water supply, although largely administered by the municipality, especially in large cities, is so administered, probably by reason of the enormous cost of the plant; but with the exception of the use of water for fires and for street sprinkling, no other reason against private water companies will hold good.

Exactly the same is true of municipal gas lighting. As far as public lighting of streets, parks, etc., it might very properly come under the head of a public measure; but the supplying of light to a private consumer, large or small, is a business that the government may have the right to regulate but not the right to carry on—and incidentally, the fact may be stated that no city has the right, although it may have the might, to regulate or fix the price of any commodity where there is competition.

In conclusion, a few axioms gleaned from Mr. Wilkiemeyer's paper may be properly quoted.

"The motive for private capital to invest in a certain line of business is destroyed when a city enters into the same line of business and conducts the business with no desire to make a profit."

"No man should be willing to be taxed in order that a city should secure capital with which to strangle private enterprise."

## Electric Power vs. Steam Power for Small Plants.

A contemporary claims that the electric motor is probably the simplest and most compact piece of machinery ever made for producing power. As much as 25-horse power of apparatus can be set up in a space less than 5 feet square, and where minimum of space is a desideratum this is an important point. There is only one moving part in the machine—*i. e.*, the armature, and only one set of bearings. The wear is entirely confined to the one set of babbitt shells, the commutator and the brushes, all of which form but a small part of the total cost of the machine, and all of which can be renewed when worn out at a comparatively small cost. When this minimum of moving parts is compared with the number of levers, valves, rods, etc., required by a steam engine, and the necessary accompanying wear and tear, the reason for the low repair account of the electric motor is manifest.

All the work which was formerly done by a steam engine in the printing department of Thurber, Whyland & Co. is now performed by a Sprague electric motor. According to Mr. F. B. Thurber all the work is now done in a more satisfactory and less expensive way than when steam power was used.

The space taken up by the motor is considerably less than that by the engine. In addition to this the attendance required by an electric motor is very much less than that required by a steam engine, being in general confined to a few minutes attention each day, while the steam engine requires, while in operation, the constant attention of a skilled en-

gineer. The following comparison of a few points of a steam engine and a Sprague electric motor, each of 10-horse power capacity, is interesting as showing the greater simplicity and economy of the electric machine:

| | Motor. | Steam Engine. |
|---|---|---|
| Number of moving parts | 1 | 9 |
| Number wearing " | 5 | 20 |
| Floor space (square inches) | 8¼ | 36 |
| Room occupied (cubic feet) | 16 | 316 |
| Percentage of mechanical friction | 1 | 30 |
| Actual H.P. percentage of indicated horse power | 100 | 80 |
| Quarts of oil used per week | ¼ | 12 |

## Andrews' Process for Purifying Gas.

On April 22d U. S. Letters Patent (No. 426,093) were granted to Mr. Wallace C. Andrews, of this city, for certain new and useful improvements in processes for purifying gas. In the specification submitted by the inventor he says:

Heretofore in the purification of gas it has either been led over solid purifying material lying quiescent in a compact body or has been passed through such. In the former case the purifying material soon becomes coated superficially by a product or by products, absolutely inert so far as purification is concerned, formed with the purifying material by a substance or by substances chemically separated from the crude gas,

Fig. 1.

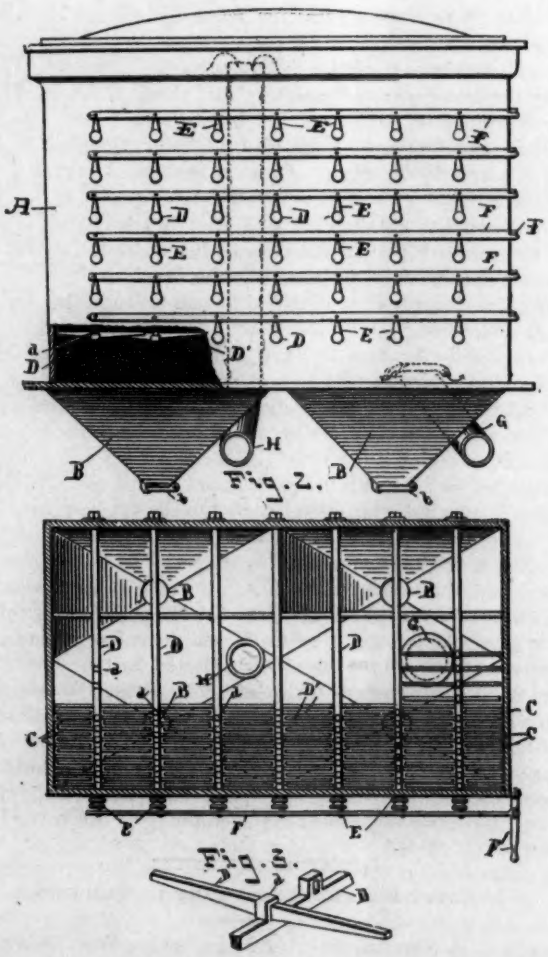


Fig. 2.



Fig. 3.



and soon becomes fouled superficially by deposits therefrom, while in the latter case the purifying material soon becomes coated and fouled internally by the same means, the gas making channels, and these channels becoming lined with the inert product or products and with the deposits. In either case perfect purification soon ceases, allowing much of the impurities of the gas to pass on, and in both cases the great bulk of the purifying material employed is kept from operation. The only remedy has been, at necessity of stoppage of the current of gas or deflection of the same to another purifier and at great expenditure of labor and loss of time, either frequently to supply new purifying material or to turn or stir up the old to present new surfaces. The gas has also been passed through a shower of lime water; but wet purifiers are troublesome, and the gas has subsequently to be dried.

The objects of the present invention are to overcome these difficulties, and to make the operation continuous.

The invention resides in the process of purifying gas, which consists in passing the gas in contact with and through solid purifying material in a state of agitation, or through a shower or stream of purifying material in a finely divided condition, whereby the active surface of the purifying material is greatly increased, the entire body of purifying material present at any one time is offered for action upon the gas, and new surfaces are constantly presented; furthermore, the invention resides in the process of purifying gas. which consists in passing the gas through a body of purifying material alternately in a state of rest and under agitation; and, finally, the invention resides in a process of purifying gas, which consists in passing the gas through successive layers of purifying material, and moving the layers progressively against the gas, discharging the last layer as spent, and resupplying fresh material at will.

It is obvious that the invention may be carried into effect in many different ways, and I do not wish to be understood as being confined to any specific embodiment in this application; but in the accompanying drawings I show a form of apparatus which will serve to illustrate the operation of the invention.

The particular apparatus shown is not herein claimed, since the same forms the subject of another application, filed Aug. 13, 1888, and bearing Serial No. 282,500.

In the accompanying drawings, in which like letters of reference indicate corresponding parts, Fig. 1 is a side elevation of a gas purifying apparatus capable of carrying my invention into effect, with a portion of the side broken away to show some of the interior parts. Fig. 2 is a plan view of the apparatus with the top removed, and Fig. 3 is a perspective view of one of the details of construction. In the exercise of my invention lime or other suitable purifying material may be agitated or caused to move vertically, horizontally, or in any other direction in a closed compartment, through which gas to be purified is passed. The purifying material may move in the compartment in one or more streams or showers, either simultaneously or in sequence, or may be agitated in bulk, and the agitation and showering may be simultaneous.

In the illustrations the purifying material is placed in several separate layers within a casing, and all the layers may be caused gradually to fall simultaneously, or one or the other may be caused to take a lower position, the falling being effected by the construction of the support upon which the layer rests and by agitation, and the gas may be caused to pass up through or across the showers, or alternately across or through a shower and through a body of purifying material.

In the drawings, *A* designates a casing, the bottom of which is formed with hoppers *B B*, closed by a valve *b*. At each end of the casing, and within the same, are rigidly attached rows of slats or arms *C*, placed in tiers, the tiers being of suitable distance apart, and across the casing are rows of horizontal shafts *D D*, likewise placed in tiers and nearly in horizontal plane, respectively, with the rows of rigid arms *C*. Each shaft *D* is provided with a series of transverse eyes, apertured lugs, or loops *d*, and in these eyes are held series of movable arms, slats, or cross-pieces *D' D'*. The shafts *D* are provided with cranks or other devices *E*, and to the cranks of each row of shafts are attached rods *F*, which may have levers *F'* for operating them. It will be clear that as one of these rods *F* is moved by its lever all the shafts of that particular row will be rocked, and as the shafts are rocked the movable arms will be oscillated. Each row of shafts may be rocked separately, or their rods may be so connected as to rock two or more of them simultaneously. When movable arms or cross-pieces *D'* are in a horizontal position they are in the same horizontal plane with the fixed arms *C*, and the outer portions of the arms of the outer shafts form with the fixed arms and the inner portions of the arms of the outer shafts form with the outer portions of the arms of the adjoining shafts, and so on mutually in each row, a grating or open platform to support a layer of the purifying material.

The gas inlet pipe is shown at *G*, while the gas outlet pipe is designated by the letter *H*. The gas outlet pipe is of course beyond the first layer of purifying material.

It is preferred to have the horizontal shafts in each row about 2½ feet apart, and to have the movable arms slightly less than 5 feet in length, with about 1½ inches space between adjoining strips.

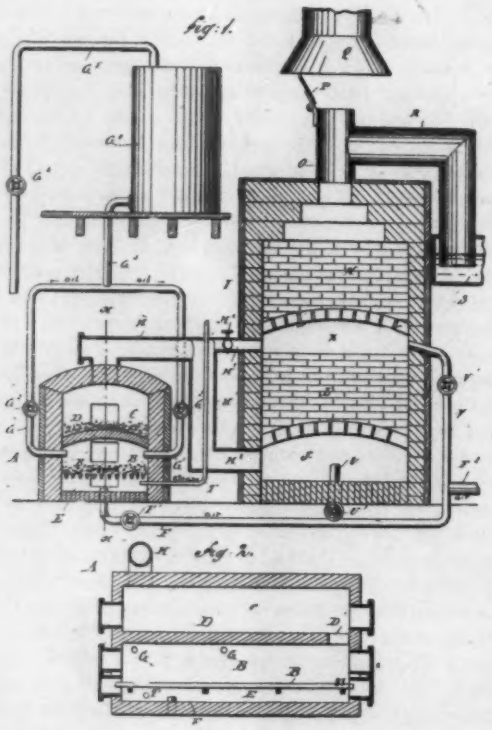
The operation is as follows: Gas entering the lower part of the casing passes upward through the lower layer of purifying material, and so on to the outlet. Either continually or when the passing gas is recognized by suitably situated petcocks to be wanting in requisite purity,

one, more, or all of the rows of shafts will be rocked, and the purifying material will be agitated and fall in a shower or stream to trap the appropriate impurities of the gas. Fresh purifying material is supplied from the top, as desired, and thus successive layers are fed forward. It will be obvious that the lowest layer of purifying material will first become inert and foul, since this layer is first met by the crude gas and is supplied from the other layers, all of which have exerted a purifying effect. Consequently this layer will be dumped into the hoppers and thence may be removed at convenience. Should it be desired to leave the purifying material quiescent during the passage of the gas, the bottom layer of purifying material will be discharged into the hoppers, when it becomes saturated with impurities, the shafts *D D* being rocked or shaken for that purpose; but the bottom layer may first be disposed of, and then the shafts of all the other layers being rocked, each layer of purifying material will be lowered, and, this done, a fresh layer of material will be supplied at the top. By this operation a great saving of labor is effected, and a much larger quantity of gas than usual can be purified in proportion to the ground space occupied, since not only is a great quantity of material immediately presented in active form, but as the tiers of purifying material may be in any number and be successively discharged, a purifier may be of great height, thus taking the place of many separate purifiers.

## The McCollum and Burt Gas Making Apparatus.

On June 24th Messrs. John A. McCollum and Benjamin F. Burt, of Riverside, Cal., were granted U. S. Letters Patent (No. 430,807) for a system of manufacturing water gas. In describing their invention the patentees say:

Referring to the drawings, Fig. 1 is a sectional side elevation of the improvement, and Fig. 2 is a longitudinal sectional elevation of the furnace on the line *x x* of Fig. 1.



The improved gas making apparatus is provided with a furnace *A*, having two compartments *B* and *C*, located one above the other, and divided by an arch *D*, having near one end an aperture *D'* for establishing communication between the two compartments *B* and *C*. Suitable doors lead into the ends of the compartments *B* and *C*, and the former is additionally provided with grate bars *B'*, below which is formed an ashpit *E*, into which discharges a pipe *F*, provided with a valve *F'* and connected with a pipe $F^2$, leading to a blasting engine of any approved construction. By thus forming doors at both ends of the compartment *B*, first one end and then the other may be charged thereby permitting us to have one end of our fire a cherry red at all times; and so with the lime compartment first one end and then the other may be freshly charged.

Into the sides of the compartment *B*, directly under the arch *D*, discharge the oil pipes *G* and *G'*, each provided with a valve $G^2$, and both connected with a pipe $G^3$, leading to an oil tank $G^4$, located a suitable distance above the furnace *A*, so that the oil flows under pressure into the compartment *B* of the furnace *A*. The oil tank $G^4$ is provided with a supply pipe $G^5$, connected with a suitable source of supply and provided with a valve $G^6$.

From the top of the compartment *C*, at the end opposite the opening *D'*, a pipe *H* leads to the fixing chamber *I* in the following manner: From the end of the pipe *H* extends downward a pipe *H'*, having a branch pipe $H^3$ passing through the side wall of the fixing chamber *I* and discharging into the fireplace *J*. From the end of the pipe *H* also leads a small pipe $H^2$, passing through the side wall of the fixing chamber *I* and discharging into a fireplace *K* above the fireplace *J*. The pipe $H^3$ is provided with a valve $H^4$ for connecting said pipe with the pipe *H* and disconnecting it from the same. Above the fireplaces *J* and *K* extend the checker bricks *L* and *N* respectively.

From the top of the fixing chamber *I* leads a pipe *O*, extending upward and provided with a valve *P*, which when open permits the pipe *O* to discharge into the chimney *Q*. From the side of the pipe *O* a pipe *R* extends downward leading into a washer *S* of any approved construction.

From the air supply pipe *F* leads a short branch pipe *U* provided with a valve *U'*, and extending into the bottom of the fireplace *J*. A similar branch pipe *V* leads from the end of the supply pipe $F^2$, and is provided with a valve *V'*. The branch pipe *V* leads into the fireplace *K*. A steam pipe *T*, connected with a suitable source of supply, passes through the pipe *H* and discharges into the ashpit *E*.

The operation is as follows: On the top of the arch *D* is placed a suitable quantity of lime, and on the grate bars *B'* a coal or coke fire is started. The valves $G^2$ are closed so that no oil is passed into the compartment *B*. The valves $H^4$, *F'* and *P* are opened and the blasting engine is set in motion, so that a blast of air passes from the pipe $F^2$ into the pipe *F*, and from the latter through the fire in the compartment *B*, whereby the heat generated passes upward through the opening *B'* into the compartment *C*, and from the latter through the pipes *H*, *H'*, $H^3$ and $H^2$ into the fireplaces *J* and *K* of the fixing chamber *I*. The heat, passing through the fireplaces *J* and *K* heats the bricks *L* and *N*, and finally the residue of the heat passes through the pipe *O* into the chimney *Q*. When the checker bricks *L* and *N* are heated to the proper degree, the valves *P* and $H^4$ are closed, after which the valves *U'* and *F'* are closed, so as to stop the blast into the fireplace *J* and the compartment *B*. The steam is now permitted to pass through the pipe *T* into the ashpit *E* and through the coke or coal fire on the grate bars *B'*. The steam on passing through this fire generates a gas, consisting principally of carbon dioxide and carbon monoxide, according to the fuel, coal or coke, used. At the same time the valves $G^2$ in the pipes *G* and *G'* are opened, so that oil flows from the tank $G^4$ into the top of the compartment *B*, in which it is burned and forms a light and a heavy hydrocarbon gas which mix with the gases above mentioned. The mixture of gases passes through the aperture *D'* into the top compartment *C* and over the lime contained in the same, so that all sulphur contained in the gases is taken up by the lime and retained. The partly purified gases now pass from the compartment *C* into the pipe *H*, and from the latter through the pipes *H'* and $H^3$ into the fireplace *J* and through the checker bricks *L* into the fireplace *K*, and from the latter through the checker bricks *N* into the pipe *O*, connected by the pipe *R* with the washer *S*, in which latter the gases are purified. When the fixing chamber *I* has cooled off, the valves *G* are again closed, and the generator is heated in the manner above described. By this reheating the sulphur previously taken up by the lime in the compartment *C* is burned and passes off with the heat to the pipe *H* and to the fixing chamber *I*, and from the latter it passes into the chimney *Q*, the valve *P* then being open.

## A Novel Plan for Excavating in Quicksand.

Mr. Albert F. Noyes, Municipal Engineer for West Newton, Mass., in a discussion on the best methods of conducting excavating works, during a recent session of the New England Water Works Association, contributed the following, from personal experience:

Having had occasion to make an excavation some 15 feet in quicksand, near buildings, it was found that if the work was conducted in the ordinary way a settlement of the foundations would be likely to occur. Mr. Noyes, therefore, adopted the following method which proved successful: The excavation, as stated, was about 15 feet deep, about 60 feet in length, and 8 feet wide. Usually below these veins of quicksand there are veins of a coarse material which form ready conductors for the water, and the vertical distance through the quicksand

is usually less than the horizontal distance; the ground water has the least resistance in the vertical direction, and tends to soften and take up the quicksand with it. If the water is drawn out, or the water level lowered below the bottom of the trench, this fine material becomes compact, very much like clay, and excavations can be easily made with perfect safety, and the use of a light sheeting. In the case referred to fourteen 1¼-inch pipes were used and were driven equidistant about the excavation to be made with the ordinary perforated well point, having attached outside a fine mesh brass screen. They were driven into a stratum of coarse material from 35 to 50 feet below the surface of the ground. The pipes were ganged together, and attached to a common plunger pump, and the water was drawn down. The normal level of the ground water was within some three or four feet of the surface of the ground, so that the ground water had to be drawn down some 10 or 11 feet. It was found by test tubes outside of the gang that the water could be readily held to a level, which insured the excavation being made without any difficulty. In fact, the banks were dry, and the lower portion of the excavation was very firm. In this case the well points, after use, were sold at nearly the first cost. The pipes, which were taken from the stock at the pipe yard, were returned and used again, so that there was little loss in that way; and the whole cost of driving the pipe was about $18, so that the expense of that method was really less than sinking a well outside of the excavation in the usual manner.

[A Paper read before the British Gas Institute.]

## The Extension of Gas Companies' Responsibility to Fittings Beyond the Meter.

By Mr. T. Travers.

If the popularity of gas as a lighting agent is to be maintained, it will not be sufficient simply to deliver it at a low price at the consumers' meters. We must go farther, and follow the gas even to the point of combustion, in order to ensure that consumers obtain the best results from its use. I hold that at any time this would have been a wise and liberal policy to pursue. But now that there are formidable rivals in the field, the matter can no longer be treated with indifference; nor can the feeling be allowed to prevail that, because we have hitherto, to an extent, enjoyed a monopoly, our position is secure. It is secure, I will say, but only so long as we can prove to our consumers that gas is the cheapest, as well as the most convenient form of artificial light. Every step we make to sustain the character of gas in these respects, tends to render our industry more permanent, and enables us to hold our own against all comers.

Now, why is it necessary that in order to put gas on this satisfactory footing, gas companies should take the matter in hand; and how far ought they to go? My experience leads me to reply—and I am sure the members of this Institute can fully endorse what I now state—that in hundreds of cases consumers are not obtaining, from one cause or another, the value that they ought to obtain from the gas. Take the complaint-book of the company, and what does it reveal? A daily record of defective lighting, produced by wretched fittings, bad burners, and lights injudiciously fixed. The discredit of this state of things falls on the company, while the person who is really to blame escapes scot-free. It is therefore, to an extent, in a spirit of self defence that gas companies should take steps to alter and improve this state of things,

In order to secure good and economical lighting, the conditions may be briefly stated as follows: (1.) The pipes should be of such size as to admit a free flow of gas to the utmost extent of the requirements. (2.) The lights should be so fixed as to effectually illuminate the objects intended. (3.) The burners should be of a kind suitable for the quality and pressure of the gas supplied in the district. How often are the foregoing conditions complied with? Very seldom indeed; while on the other hand, cases such as the following are too frequent. Complaint was made in connection with a certain church that the gas was so bad that, during the evening service, the congregation could not see to read. Of course, there was nothing wrong with the fittings, because they were new throughout, and the pipes were new. On examination this was found to be correct; but it was also discovered that the clusters (of 15 lights) which lighted the building were each supplied by a ¾-inch brass pipe! A gentleman in consequence of some additions to his house, increased the number of lights, to supply which he was advised to enlarge his fittings. The gas fitter erected some stand-pipes of 1-inch wrought iron pipe; but he supplied each of these through a ¾-inch horizontal pipe, which was under the floor—the result being that the supply of gas was very inadequate. Of course, the bad lighting was put down as the fault of the gas, since it was evident by the large stand-pipes that the fittings were ample. It was only after a thorough inspection of the whole place by an official of the gas company that the real cause of the deficiency in the supply was discovered.

Frequently the consumption of gas is extravagant, and the light unsatisfactory, through want of attention to the law of optics, which specifies that the light per unit area diminishes as the square of the distance increases; so that the farther the light is removed from the object intended to be illuminated, the more (in the above ratio) is the intensity of the illumination diminished. On the other hand, attention to this important principle will lead to economical and satisfactory lighting. As a case in point may be mentioned the following: The members of a literary society recently complained that they were unable to read at the tables in the center of the library, owing to insufficiency of light. I inspected the place, and the cause of the insufficiency was evident. While alterations made in the building some time previously were in progress, the idea got into the heads of some of the members that brackets on the side walls would look much better than the existing pendants, which had been used for years. Accordingly, the alteration was decided upon, and a number of brackets were put up to correspond with the number of burners which had been on the pendants. It was at once seen that the change did not improve the lighting of the room; and therefore the next move was to increase the number of burners on the brackets. At the time of my visit, they had 30 per cent. more burners than when they had the original pendants; yet the light on the tables was unsatisfactory. Here there were more burners, a higher gas bill, and a very much inferior light which, of of course, was attributed to the low quality of the gas. Such was the verdict of the members—a verdict, however, which was reversed on re-establishing the pendants in their former positions.

The pipes may be ample, the pendants or brackets in their proper positions, and yet unsuitable burners may do the mischief. When it is remembered that every properly constructed burner is made for a certain quality and pressure of gas, it will be seen that more care is required in the selection of burners than is usually given by gas fitters. There are many towns in which the pressures vary so much that a burner suitable for one district will not give equally good results in another; and yet I have never known a gas fitter to take the trouble to ascertain the pressure, in order that he may select the most suitable burners. In fact, gas fitters regard the pressure and quality of gas as matters outside their domain. With this opinion I fully agree; and for this reason I would have gas companies control, not only the supply of gas, but also of burners.

Burners should be renewed periodically; the advantage of this being obvious. Consumers are often reminded of the necessity of changing their burners; and they do get them changed, to their cost. A gentleman informed me some time ago that he had purchased from a traveler a number of burners, which were to give double the quantity of light, and save 30 per cent. of the gas, as compared with the usual burners; but that the traveler did not wish the gas company to know that he was in town, because, owing to the loss they would sustain by the introduction of his burners, they might make his visit disagreeable for him. I was, however, allowed to test the burners, and somewhat surprised the gentleman who had purchased them by telling him that, when he required another lot of the same kind, I should be happy to supply them at one-tenth the sum he had paid, but that I would not give him the same guarantee of their efficiency.

On a subsequent occasion, I found two gentlemen of the same calling anxious to court the favor of the Cork Gas Company, or rather of its manager. They called on me one morning, armed with all the paraphernalia of "gas burner men"—to wit, pliers, taps, etc. They first inquired what number of burners we had in Cork; and being informed about 40,000, they calculated that they would succeed, by their plan, in supplying half this number of new burners at 6d. each, or £500. Of course, they would not require the whole 6d.; two-thirds of it was sufficient for them. I was welcome to the other third, if I only permitted the use of my name when it was requisite, and expressed my approval should occasion require.

Another adventurer dropped into a trap, for almost the first establishment on which he called was the warehouse of a gentleman who was for upwards of a quarter of a century a Director of the Gas Company, and was himself a manufacturer of gas. The proprietor happened to be in at the time, and heard from the traveler that he was selling the burners of a certain well-known maker. He was asked to show them, and produced a lot of old-fashioned iron burners. "Why," remarked the gentleman, "these are iron burners; and I am accustomed to get a supply of the burners you speak of, which are of brass, with clay tops. How do you make out that these iron burners are from that maker?"

The traveler was certainly "cornered;" but he managed to get out. "I did not say that I was selling burners made by that manufacturer. These burners are my own; and my name is the same as that of the patentee you refer to. As these burners are mine, I am at liberty to call them by my name." The suggestion that he should "clear out" was acted upon most promptly.

The cases I have given above are but samples of very many of a similar character with which I am certain you are all familiar. It would be well were the public equally so, as it would show them the extent to which the gas supply beyond the meter is handicapped. Now that competition is becoming keen, the most we can expect is a fair field; and this we cannot have if we rest satisfied with supplying cheap gas and not cheap light. Why, our friend Mark Twain believed cheap gas to be a delusion; and therefore advised consumers who wished to have low gas bills to ask the gas companies to raise the price of gas.

In order that the consumer may obtain the full benefit of the present moderate price of gas, gas companies should assist him to obtain the best results at the point of combustion, and not allow him to be subjected to the haphazard style which has been too prevalent, to the injury of the reputation of gas companies. It is no wonder that a consumer should be misled in this matter, when he finds the bill and the light in inverse proportions. It would take a large amount of logic to dislodge from his mind the idea that he has a strong case against the gas company. Hence it is mutual interest that an arrangement should be made between company and consumer, by which the control of the former extends over the fittings of the latter, so as to ensure that fittings, burners, etc., are of such a character as will give all the satisfaction it is possible to derive from the combustion of gas.

In taking the matter in hand, we but follow the steps of other companies who cater for the public. There are the water companies, who will not connect the domestic water supply unless they are satisfied that the pipes in the house are of the proper size, and have been tested. On the Continent there are oil lamp companies who send round the town to change the lamps for the consumers, and see that they are in good order for giving light. In this respect our colleagues in the supply of artificial light, the electrical engineers, seem to have shot ahead of us. They have laid down certain rules on which installations in private houses are to be carried out, a study of which would suggest points on which a similar control by gas companies might be exercised with advantage. For instance, they specify that all conductors shall be of sufficient sectional area to allow 100 per cent. more electricity to be sent through them than is necessary for present requirements. If gas pipes beyond the meter had 25 per cent. more area than the absolute requirements called for, gas consumers would be well off. The electrical engineers suggest the best positions for fixing the lights, and specify that no material is to be employed except such as has been inspected and tested; and they strongly urge: "If you put up electrical work to tender, remember this, that any firm, by arranging to place inferior quality work on your premises, can easily under-price other firms that are conscientious; and experience proves that inferior work is nearly certain to result in a fire breaking out sooner or later, perhaps between floors, ceilings, or roofs. Be careful, therefore, previous to accepting a low tender, to make yourself certain that the same quality of work has been estimated for as that in the higher tenders." For the sake of respectable gas fitters, as well as for gas companies, it would be well if gas consumers were led to adopt the same precautions when asking for tenders for fittings. I remember a gas company, some years ago, which had works in three of the largest towns in Ireland and in some English towns, and which formulated regulations by which they would supply gas only to houses fitted up by gas fitters who held licences from them.

Referring again to water companies, look at the protection afforded to them by the examination of plumbers, and their subsequent registration. I certainly believe that gas companies should be placed in a similar position, and that they should control the fittings to the following extent: (1) That no meter should be fixed unless the pipes are 30 per cent. larger than the present maximum requirements. (2) That the pipes should be properly tested and inspected, so that there will be no chance of condensation collecting in them. (3) That in regard to the position of lights although the selection of brackets or pendants must be a matter of taste between the consumer and the fitter, yet the supply of burners should be in the hands of the gas company—at least they should control them to the extent of selecting the burners most suitable to the gas which they supply. The latter point cannot be too strongly insisted upon, as gas fitters are, for the most part, unacquainted with the necessary qualifications of suitable burners. Burners are frequently found in use under conditions very different from those for which they were designed. I have often been amused at the surprise expressed by consumers at the evident improvement in the light when proper burners had been substituted for unsuitable ones. I would also put the gas company to the expense and trouble of changing the burners periodically; for I think that the satisfaction which would be thus created in the minds of the consumers would amply repay the outlay in this respect. When the light is unsatisfactory, consumers will grumble at the gas bills, however moderate; but when, through the agency of good burners, the illuminating power of the gas is increased, the knowledge that they have good light induces consumers to pay readily bills which, under other circumstances, they would consider exorbitant. I was particularly struck some time since with the answer I received from the manager of a small works. Having noticed that his consumption of gas was higher than that of other towns of the same population in the district, I asked him how he managed to do so well in this respect. "I look well after the shop windows," said he, "and keep the lights in them in the best order possible."

Sometimes consumers will not give gas managers credit for good intentions. They say that every move made by a gas company's official has but one object—to get as much as possible out of the pockets of the consumers—and that, therefore, suggestions coming from them must be received *cum grano salis*. "To say that different forms of globes and burners would make an improvement is all nonsense. If the gas were good, all globes and burners would equally display its brilliancy. There is surely nothing in a globe or burner that would enrich the gas." In such a strain did a clergyman argue with me some time ago; and I mention his case because I have found gentlemen of his calling the most difficult, in this respect, to turn from the error of their ways. In the hall of his house there was an excellent light, but in his study the globes and burners were well calculated to produce that "dim religious light" so appropriate to our cathedrals. The globes and burners were somewhat ancient, and not inartistic. To remove them would be desecration; and therefore they must remain, nowithstanding that they obscured 50 per cent. of the light. On the gas company rested the onus of supplying this particular chandelier with gas of something like double the ordinary illuminating power; and that a gas manager can do a turn for a friend in this way appears to be the impression on the minds of some. I know one case in which a consumer became a shareholder for no other reason than to get a share of the special-quality gas that he fancied was supplied to shareholders; and he is satisfied that he has succeeded in securing this special supply. His light was really very bad; he had had in the fitter, who had spent a large amount of time to no purpose. The gas company's man set things to rights by putting on new burners, and thereby producing the extra quality of gas intended for the favored few.

It may be said that gas companies, by assuming control to the point of combustion take upon themselves additional responsibilities, and considerably increase the duties of their staff. My answer is that every company, even the largest, has already established a precedent in this way. When I had the privilege, some years since, of reading a paper before you on "The Way in which Gas Companies should promote the Use of Gas for Heating Purposes," I suggested that gas companies should take the matter under their own control, in order that the application of gas in this way might be carried out in the most skilful manner. In the half-score years which have elapsed since then, the progress which has been made in this direction is worth consideration; and I question very much if anything like this development would have been possible had not gas companies taken the matter up and extended their control to the point of combustion of the gas for heating purposes. The success of the movement has fully warranted the outlay necessitated. I assert, therefore, that if steps such as I have attempted to indicate in this paper, be taken in reference to gas for lighting purposes, the success attained will equally warrant the trouble and responsibility entailed in connection therewith.

*Discussion.*

Mr. John West (Manchester) said the President in his address had dwelt on the importance of having proper burners; pointing out that it was of no use making good gas unless there were proper appliances for consuming it. Years ago he had been much interested in this subject, and had read papers upon it. He selected a number of burners in general use, compared them with modern burners, and exhibited them to the public at Maidstone, with the view of showing what rubbish the gas fitters would supply them with, and what they might get if they went to the proper place, where there were men who could guide them. In many towns the whole of the fitting-up and supply of burners was left in the hands of gas fitters, who, as a rule, knew very little about the subject, though there were some very intelligent men among them; and therefore the onus rested on gas engineers to show consumers of gas

how best to use it. He heartily supported Mr. Traver's suggestion that gas companies should supply the public with good burners, which cost very little. When he was at Maidstone, their inspectors always had a supply of burners in their pockets; and if any complaint was made about the gas, they put one on. It did not cost much; and it removed a cause of dissatisfaction. As regarded the fitting department, that was a very complicated subject; and he did not see how they could take it out of the hands of the ordinary tradesmen. He was brought up at Northampton, where the gas fitting was for 12 years a monopoly in the hands of the Gas Company. There was then a considerable movement against it; and the Company decided to give it up. Then, of course, the tradesmen rushed in; but before many years had passed, the very people who had caused the disturbance were the first to come back and ask the Gas Company to take up the fitting work again. If gas managers would themselves really look after the consumers of gas up to the point of ignition, they would be conferring a benefit upon the public; but it was difficult to decide how this was to be done. They must have the co-operation of the consumer; and he (Mr. West) hardly knew how this was to be secured. Some people looked very suspiciously on gas companies —he did not know why, as they did not seem to do so with regard to electricians. No doubt the latter had taught them a severe lesson in this direction. In Manchester, the electricians were very superior men. He thought that in the past gas managers had neglected their duty in this matter. For 27 years he was connected with companies who really did the whole of the gas-fitting. They also made arrangements to provide stoves; and by this means they were able to deliver a larger quantity of gas during the daytime. In his opinion, it was the duty of gas managers not only to look after the interests of their companies, but also those of the consumers.

Mr. N. H. Humphrys (Salisbury) said when he accepted his present appointment, one of the directors had a clause put in the agreement that, in case of any special complaint, he was to make a personal visit of inquiry. One of the great difficulties was that gas companies had no legal right to make an examination of the consumer's premises, and find out how many lights were in use. Mr. Travers had referred to the "dim religious light" in great cathedrals; and this was peculiarly so in the case of the cathedral in his own city. There were only two 200-light meters; but he believed there were fully 2,500 jets supplied from them, though their combined capacity was only 400 lights. In another instance, where he was called in by a large consumer in consequence of the light being deficient, he asked how many burners there were. The reply was that that was none of his (Mr. Humphry's) business. In several other cases he found people regarded this question with suspicion; so that inspectors ought to have the right to go over the premises, and ascertain the number of lights actually in use. They had heard about the size of the pipes; but the next thing was the quality of the pipes. He had found a large number of leakages, particularly in places where they could not be seen; and he believed a great deal more leakage took place on consumer's premises than was generally supposed, especially round joints, hinges, and so on. The instance which had been given by Mr. Travers, of a large pipe in sight and a small one out of sight, was very illustrative of what happened in many cases.

Mr. D. Bruce Peebles (Edinburgh) thought it would be a very good field for some literary friend to take up the subject of anecdotes connected with gas-burner men." Mr. Travers had given some examples, and he (Mr. Peebles) could supply a great many more, which would be very useful and interesting to gas managers; but it would hardly be right to relate stories of that sort in a scientific meeting. To take up the beginning of the subject—the size of the supply pipes—Mr. McGilchrist, of Dumbarton, had settled this very much to the satisfaction of his Committee and the consumers. He had a series of rules printed; and all contractors, builders, gas fitters, and plumbers had to comply with them, and have all pipes of a special size as specified, before he would allow a meter to be put upon the premises. If managers generally could follow out this line, it would be productive of great comfort to the consumers. In Edinburgh there was a very fine house in the West End; and his firm were written to to put up a governor on the meter. A man went and fixed a governor quite sufficient to supply all the necessary requirements of the house. Of course, they could not control the pressure, which varied with the altitude. He got on exceedingly well with all the rooms in the house until he came to the billiard-room. This was a little out of the way; and in order to get to it, the main pipe had to be tapped, and a small pipe taken to it. The gas fitter, without at all considering the quantity of gas to be used, had put in a very small pipe; and when they came to this, all the pipes in the house had to be altered to afford sufficient pressure to supply the room properly. This was a case where, through the ignorance of the gas fitter, a very fine house had been completeley spoilt as regarded the economical consumption of gas. Other sources of much trouble at the present time were the regenerative burners, and the apparatus required for governing the pressure to them. His firm were constantly having complaints about these governors; and it was astonishing to find that, when the matter was inquired into, it was often found that the governors were being put in upside down, notwithstanding all the printed and verbal instructions given. A few years ago he showed the North British Association of Gas Managers an experiment which brought the thing clearly before the mind. He selected four burners, with 5-10ths, 8-10ths, 12-10ths, 17½-10ths, pressure respectively; and they were arranged to burn 5 cubic feet of gas per hour at these pressures. Even a gas engineer would scarcely believe that the gas burning in the first and the last was of the same quality—so great was the difference. The importance of burning gas at low pressure could be very effectively brought before consumers in this way.

Mr. P. H. Wilkinson (Harrogate) said that this was a subject which he had been long looking into; his idea being that the consumer ought to have as much illumination as the gas could give him. He had been working at this matter for about 18 years—giving away the best burners, and testing all kinds of new burners that were introduced. He had, however, been met with objections on many sides, until at last he determined that he would, by some means or another, find a burner that would, at a very small cost indeed, afford as much light as could be obtained by the most expensive burners; and he had succeeded in a very simple manner. He procured some ordinary German steatite burners, costing about 7s. 6d. per gross, having a small orifice at the bottom, and a larger one at the top. He had them made specially—the general size being what was called "7-4" (a No. 7 burner put in a No. 4); and by simply regulating the pressure for this particular gas, he could get something like 90 per cent. of the value of the gas by these burners. He sold them at 1d. each, and had no difficulty in getting rid of them. Great satisfaction was expressed among the consumers, who gave him credit for making gas twice as good in quality as formerly. He should add that he took off the burner, and put in a small quantity of sparrow-shot until it was regulated to the extent required, so that the burner would do very well between 20-10ths and 40-10ths. There would be no noise whatever between these pressures; though, of course, a little more gas would be consumed with the higher pressure. There was this advantage about it, if the burner became a little obstructed with naphthaline, all that was needed was to take it off and shake it, when it would be as good as ever. He had a number of these burners that had been in use for 14 years, and were as good now as when they were first sent out. Some of the greatest difficulties arose with those customers who, while admitting that the gas manager was doing his best for them, were reluctant to believe his assertions. With regard to leakage, they had at Harrogate a system by which anyone could have his pipes examined periodically, to see if they were sound.

Mr. D. Macfie (London) said this was a subject on which almost everyone could relate his experience. Gas engineers had, he thought, a right to control the size of the meter that should be put into any building, and no one should interfere; but it was quite a usual experience to find a 10-light meter supplying 90 lights. Who was responsible for this, if not the gas engineer? No consumer could reasonably protest against a meter of sufficient capacity being put in. He had seen a 20-light meter supplying a house with 90 lights—of course, with most unsatisfactory results; and this ought not to be allowed. On one occasion, in connection with church lighting, he saw a 10-light wet meter supplying about 60 burners. The people complained of the amount of illumination that was afforded; and a gas fitter was called in, who recommended the adoption of a regulator to give increased light. On visiting the place, he (Mr. Macfie) was told that this addition had greatly improved the light. But on going to see this marvellous regulator, he found it had been loaded out of action, and was simply of no use whatever. He wondered how it was that the gas engineer had not insisted on putting in a larger meter, and then have had a regulator in proper action. No doubt Mr. McGilchrist had taken the proper steps with regard to new houses; and he (Mr. Macfie) did not see why everyone should not communicate with the builder of a new house, and instruct him in respect to the proper size of the pipes to be laid. Gas fitters came in for a great deal of abuse; but sometimes gas managers would take up a hostile position—one even refusing to allow a mercurial regulator to be fitted on a meter. He had had a great deal of experience with regenerating lamps; and he endorsed what Mr. Peebles had stated about the regulator being sometimes fixed upside down, horizontally, and all that sort of thing. Regenerator lamps were really in their infancy; and consequently fitters had a good deal to learn about them. The greatest difficulty of all was in old houses, when the pipes were of insufficient or unequal capacity.

The only remedy for unequal lighting was the adoption of governor burners.

Mr. J. Whyte (Seaham Harbor) said he had suffered a great deal of inconvenience and personal abuse over this matter; but he could not agree altogether with the remarks of Mr. Macfie, or those of Mr. Travers, that it was the fault of the gas fitter. In his own case the architect was at fault. About 18 months ago a new hall was being built; and the architect called on him to look after the supply of gas. The question to be considered was how many lights were to be supplied. The architect said 33. He (Mr. Whyte) told him that 33 burners would never light the place; but, of course, the architect knew better, though, according to the rules laid down by Mr. Newbigging, the hall ought to have had 196 burners. He told him that it would be a miserable failure, and put in a pipe sufficient to supply 50 burners from a 50-light meter. The end of it was that the hall was most inadequately lighted. Complaint was then made that there was want of pressure. However, he convinced the architect, by a simple experiment, that this was not so, but that it was want of burners which created the difficulty. Only on the previous Friday, he was called in to a similar case, where wrong pipes had been used from beginning to end; but this was the architect's fault, not the gas fitter's. At the same time the gas fitter was to blame; for he admitted that he knew the pipes were too small, but said he had only to carry out the specification. His company had now a gas fitter of their own, and sent a circular to every consumer stating that they were prepared to deal with every complaint, and to supply the best burners at cost price. Notwithstanding this, in some cases they were not admitted into the houses to examine the fittings.

Mr. J. Annan (Wolverhampton) said that Mr. Travers thought suppliers of gas ought to have power to go and examine all gas fittings; but this must be conferred upon them by some authority. He should advise all the younger members of the profession to be very chary of using such power if it were given them. He thought that, with a little courtesy and diplomacy, there was not a single case in which a consumer would not be glad to see them as engineers, and allow them to examine the fittings. He had found it possible to come to an understanding with architects; and at last induced them to agree to allow his foreman to examine every place where gas fittings were to be put in. One of these gentlemen now left it entirely to them to decide as to the pipes and fittings.

Mr. J. R. Smith (Padiham) thought the manager of a gas works should have the oversight of consumers' fittings; but he did not know that it was desirable they should take upon themselves the responsibility that would go with it. He would give a little experience of his own, which might be novel. He had fixed at a place of worship a 10-light meter, which worked satisfactorily for a time; and then on one occasion the lights suddenly went out. He could not discover anything wrong. The meter was a very good one, and seemed to be going properly; and at length it righted itself. However, he was asked to put in a larger meter; and one for 20 lights was supplied. This went on very well for a time; and then suddenly at another service the lights were extinguished again. They examined the meter but could not see anything wrong. Then he told the gas fitter to cut off the out-let pipe just above the meter. This was done when out dropped something which he found was a cylinder made of tin about 3 inches long, at either end of which was a piece of gauze. This had been put in probably as a regulator; and it seemed to have operated in this way. It went on for a time until the condensation from the gas filled up the gauze, and then out went the gas. In consequence of extensions of lighting, the use of gas stoves, and other changes, the conditions of supply were constantly being altered, so that the meter originally put in was not sufficient. It was very desirable, therefore, that pressure should be brought on builders, in order that in new buildings a place should be reserved in which a stove meter might be fixed.

Mr. J. McGilchrist (Dumbarton) said the consensus of opinion seemed to be that managers should have the control of gas fittings; but the difficulty was that they had no power. Fourteen years ago, having a Special Act of Parliament which did not give any power in this direction, he tried what could be done with the Dean of Guild Court. As they had to do with all pipes in connection with buildings, he thought the gas pipes might well be included; and he induced the Court to stipulate that gas pipes were to be fitted up in accordance with the standard sizes to be obtained at the Corporation Gas Works. There was a little difficulty at first; but now it was understood among all the gas fitters that they must have the pipes according to this standard, otherwise they had to be taken out and re-fitted before gas was supplied.

The president said that he could assure the members that the apparatus mentioned by Mr. Peebles, showing four burners at different pressures, was one of the best practical demonstrations that could be put before a dissatisfied consumer. One could be seen at the Clyde Gas Works; and if managers would introduce them generally, it would, he believed, be a conclusive answer to 90 per cent. of the complaints brought into the office.

Mr. Travers, in reply, expressed his satisfaction with the discussion, which left very little for him to say. With regard to the book of anecdotes which had been suggested, he did not think there was anyone more competent to prepare it than Mr. Peebles himself, judging from a pamphlet he had already received from him.

## Considerations on Water Gas at Home and Abroad.

In a recent number of the London *Journal* we find the following, which is likely to prove interesting reading for American gas makers:

It would be interesting to hear the result of a serious attempt to carry into practice the patent of Mr. W. Crookes and Mr. F. I. Ricarde-Seaver, as described in the "Register of Patents" in the *Journal* for May 20 (p. 930), by some experienced water-gas manufacturer. The idea of this invention is to absorb the carbonic oxide of water gas by passing it at a red heat through a mixture of soda lime and quick lime; obtaining in its place a further and equivalent bulk of hydrogen. It is not for us to criticize the chemistry of Professor Crookes; and we must therefore concede to him the theoretical feasibility of the reaction proposed in this patent specification. It is stated that the lime is the only material that wastes in the specified circle of operations, and that this can be revivified by burning. What remains to be proved in practice, however, is that the quantities of material required for the process are such as can be economically dealt with. It appears from the patent specification that every 1,000 cubic feet of water gas produced in the ordinary way, would require 320 lbs. of soda lime in the hot carbonating chamber; and it will be immediately perceived by any practical gas maker that unless the treatment of this weight of material when it has done its work is of a very simple kind, its presence in the gas-making plant will be no joke. If no less than 320 lbs. of this material has to be made red hot for every 1,000 cubic feet of water gas, and afterwards has to be taken out of the hot chamber, cooled down, washed, remixed, replaced, and reheated, it scarcely seems a practicable process. To make 1,000 cubic feet of water gas in a 3-feet generator would take about ten minutes. Of course in a battery of generators such as would be employed in a works of any considerable size, the gas would be produced very rapidly indeed. For dealing with 100,000 cubic feet of such gas daily by the Crookes and Ricarde-Seaver system, would entail the handling of at least 15 tons of soda lime per day, which would apparently be a serious matter, if only as a question of labor. However, we have no desire to depreciate in advance the value of a well-intentioned suggestion for depriving water gas of the drawback which the presence of a heavy proportion of carbonic oxide undoubtedly is to its general usefulness. If this undesirable constituent of water gas could be replaced with hydrogen, it would be a good thing, not only on account of the comparative harmlessness of the latter, but also, as recognized by the inventors, because hydrogen carries illuminating hydrocarbons better than carbonic oxide. If, therefore, we could turn water gas wholly into hydrogen, it might, and probably would, be found possible to carburet it with very much less than the proportion of mineral-oil gas now found requisite for this purpose; and the saving to be effected in this way would pay for a great deal of labor in handling lime. And what is more, the process of carbureting might be rendered much simpler and more economical.

Common water gas containing almost half carbonic oxide before the oil gas is put into it, is not at all a good carrier of the hydrocarbon gases. It does not throw them down, but it absorbs a great proportion in order to attain a useful degree of luminosity. Ordinary coal gas is much more economical in this respect; carrying additional hydrocarbons, designed to improve the illuminating effect with steadiness and reliability, even when these are only introduced in the state of vapor, as in the Maxim carbureting apparatus—which, by-the-way, is being developed after an enlarged pattern for use in gas works. It becomes a question, when gas of a high illuminating power is required, whether this cannot be insured by the use of a moderate quantity of mineral oil or naphtha, instead of by carbonizing a costly description of cannel.

The attempt of Messrs. Crookes and Ricarde-Seaver to deprive water gas of its most objectionable constituent from the point of view of public safety, recalls a controversy which has almost died out on the other side of the Atlantic. The engineer of an important city of New England recently remarked, with regard to this aspect of the question of water gas, that it is a point upon which the general public are supremely

indifferent. If it is to be taken for granted that for every 200 million cubic feet, or thereabouts, of water gas sold, somebody is killed, whether by accident or design, the United States public regard the matter with complete indifference. This is not the point upon which the fortunes of water gas companies turn. If they can supply a gas brighter, cleaner, and as cheap as coal gas, they can do business, regardless of the more dangerous quality of their product. And it may not be superfluous to explain here that water gas has made considerable headway of late in the States; and not because it is cheaper to manufacture than coal gas. Indeed, where the two are on a fair equality of manufacturing facility, water gas is a little dearer than coal gas in the holder. The reasons for water gas being now preferred, either altogether or as an auxiliary for winter and occasional use, by American gas engineers who have hitherto made coal gas only, are the ease and cheapness with which a superior illuminating power can be insured, the quickness with which the extra supply can be obtained if required on an emergency, and the independence of unskilled labor which water gas plant confers.

To take the last point first, it may be remarked that the troubles of employers of labor in the United States far transcend all that has yet been experienced of the kind in this country. The roughest stokers in gas works situated on the Atlantic coast are paid $3 per shift, or 12s. 6d. per day; and their living expenses are not 10 per cent. higher than those of the corresponding class in this country. They have votes, and are accordingly truckled to and spoilt by the professional politician class, and upheld in every extravagance by the local newspapers. Their Unions and Mutual Societies of various kinds are omnipotent; and they do pretty much as they please in that prosperous land. They are still unsatisfied, because they know that the protectionist system of the States has established artificial values for all commodities; and they believe that if this system is partly the cause of their own high wages, it returns more than a fair share of advantage to the capitalists and employers of labor who keep it up. Such is the jealousy and distrust between employers and employed in the States, that a French publicist recently declared, without contradiction, America to be the country in the world where a social revolution is most likely to happen on account of the bad relations between employers and employed. This being the case, it is not to be wondered at that a gas manager prefers a method of manufacture which only requires the supervision of educated mechanics of something like his own class—intelligent fellows, most likely, who will be managers of small works themselves when they are ready for promotion—to any system dependent upon ignorant and shortsighted laborers (recent importations for the most part, probably), who do not understand on which side their bread is buttered.

As to the quickness with which a supplementary supply of water gas can be obtained, this is already fully understood by British engineers. It is an ideal system in this respect, as well as for its economy of space in the carbonizing department. The ease and cheapness with which a high illuminating power can be reached with water gas is a consideration that applies to American works more than to those of any other country. In the towns of the United States, lighting gas is generally so high priced that incandescent electric lighting can compete with it on fairly equal grounds, more especially as money is pretty plentiful thereabouts just now. Being without considerable advantage in the matter of price, and having the inconvenience of a hot flame, which is a serious drawback to the popularity of gas during the fervid American summer, the gas seller must cast around for some counterbalancing attraction, and this he finds in a high illuminating power. It is an experience in many American towns, where there has been hitherto no demand for anything better than a common coal gas of 15-candle power at the works, that gas of this quality does not compare favorably with a good incandescent electric lamp, which, as a rule, is worked to better effect in the States than here. A struggling electric light company in an American town does not mind breaking a large percentage of lamps, if the rest can be pushed to such a point of brilliancy as to make the coal gas flames opposed to them look red and smoky. Competition upon these lines naturally wakes up the gas manager, who has perhaps in the uneventful past regarded a photometer as an exotic luxury. He immediately "goes for" the competing illuminators with the best gas he can procure; and here the water gas people can lend him a helping hand. To fetch a coal gas of 15 candle power up to 30 candle power is a serious, often an impossible undertaking. There is hardly any coal in America of a quality that could be depended upon to return this result; and nothing would please the proprietors of American cannel deposits more than to be placed in a position to establish a sure "corner" in this rare article. Oil and naphtha, however, come to the rescue. When water gas is once made, the additional cost of raising its illuminating power to 30 candles, as compared with that of making 20-candle gas, is a mere trifle—a matter of a gallon of oil or less per 1,000 cubic feet. Many American gas managers say that though it would not be worth while to make 20-candle water gas, to say nothing of any lower quality, it pays to make it of 30-candle power, purely for the sake of knocking out the electricians. The incandescent lamp is nowhere beside 30-candle gas; and this is one reason why water gas is spreading in the States.

From all this it is evident that the question of water versus coal gas is a great deal more than a question of carbonic oxide. The conditions of the American employment of the article are so different from those that govern the gas supply of this country, that even the success of Messrs. Crookes and Ricarde-Seaver's patented process would not radically alter the problem presented to those who seek to introduce illuminating water gas into British gas works. If the reduction of the carbonic oxide, and its replacement by hydrogen, enables the duty of carbureting to be done with one-half of the petroleum at present required for the purpose, this process may be considered to have helped forward the economical solution of the question that has at the present time so many deeply interested students. If not, it may be a curious chemical development; but the chances of its practical adoption here or elsewhere are not great.

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

RUMOR, well authenticated, however, as to the matters prophesied about, has it that it costs the city of Alameda, Cal., something over $1,000 per month to maintain its municipal arc lighting plant, which is of the Jenney type. The lights (100 in number) are of the nominal 2000-candle variety, and are lighted in accordance with a moontable. This charge of $1,000 per month contains no allowance for depreciation or interest, and the candle power of the arcs actually maintained will certainly not average in excess of 650. That wastefulness and extravagance are characteristic of the management of this municipal lighting enterprise would seem to be borne out in the statement that a local firm (Messrs. Morgan & Thallon) have offered to take over the plant and furnish the corporation with light equal to that which it now receives for the sum of $400 per month, while the Oakland Gas Light and Heat Company, whose plant is not far from the line of Alameda, offers to supply arc lights to the latter at a rate guaranteed to save Alameda city at least $6,000 per anuum. We have only to add that the authorities refused to accept either of the propositions.

THE city authorities of Worcester, Mass., and the proprietors of the Worcester Electric Light Company have agreed upon a compromise rate for the public arc lighting of that city. Under this agreement the Company is to receive 40 cents per lamp per night (2000-candle power arcs, on an all and every night table), as against the former charge of 55 cents per night. The contract is to last for three years, and the city will abandon the attempt to install a municipal electric lighting station.

CONGRATULATIONS to Supt. Prichard, of the Lynn (Mass.) Gas and Electric Light Company are in order over the success that has attended his notification to the residents of a decrease in gas rates—the reduction came into effect on the first inst. The concession was a substantial one, in that it amounts to 20 cents per 1,000, equivalent to a net rate of $1.60 per thousand.

A CORRESPONDENT writes as follows: "At the annual meeting of the San Jose (Cal.) Light and Power Company the following officers were chosen: President, Adam Riehl; Vice-President, A. Eaton; Treasurer, C. T. Ryland; Secretary, W. W. Gillespie; Directors, Adam Riehl, C. W. Quilty, Uriah Wood, J. K. Prior and Amasa Eaton, of San Jose, and Lloyd Tevis and Geo. H. Roe, of San Francisco. After a prolonged discussion it was determined to completely rebuild the gas plant in accordance with the latest improved plans, the betterments to include a gasholder capable of storing 150,000 cubic feet. The main system is also to be thoroughly overhauled and extended, the Superintendent being ordered to bury at once the new mains in those streets which the city proposes to repave with asphalt. The estimated cost of the undertaking is put at $100,000, and that expenditure is all the more significant when it is remembered that the Company has for some time been engaged in the supply of arc and incandescent lighting."

MR. CLARK, from the Sanitary Committee of the Atlantic City (N. J.) Councils, recently reported to the Board that the local Gas Company had adopted a plan for consuming the refuse from the works which formerly had been permitted to run into the marshes back of the city. President Barstow, of the Gas Company, says that this will be a prosperous season for that enterprise.

AT the annual meeting of the Burlington (Vt.) Gas Light Company the following officers were chosen: President, Wm. Wells; Vice-President, B. B. Smalley; Secretary, Treasurer and Superintendent, F. H. Parker; Directors, Wm. Wells, U. A. Woodbury, B. B. Smalley, J. S. Pierson. A. G. Pierce, R. G. Severson and F. H. Parker—all re-elections.

THE charter obtained by the proprietors of the Birmingham (Ala.) Fuel Gas and Heating Company specifies that the initial capital stock may be placed at $250,000, with the "privilege of increasing it to $1,000,000." These fuel gas proprietors have great notions about the capital amounts necessary to carry on their schemes.

IT is said that "certain capitalists" who are about to apply for a fuel gas franchise for Moline, Ills., propose to capitalize their venture in $300,000. Another strike?

THE Cheltenham Electric Light Company's (Philadelphia) ordinance authorizes the proprietors to carry on their business in the district bounded by Cheltenham avenue and the Philadelphia and Reading Railroad crossing to Washington lane, to Limekiln pike, to Mill street, to York pike, to Olney road, to New Second street, to Cheltenham avenue, and back to the plant. In consideration of this grant the Company agrees to "light, free of all cost, all police and fire stations and public school houses along the line, also to furnish 5 arc lights for street lighting purposes."

AS was intimated by us some weeks ago would be the case, Mr. Gilbert Allen, former President and Treasurer of the New Bedford (Mass.) Gas Company, declined a re-election to those offices, but consented to act as a Director. Mr. R. B. Taber also resigned his position as Secretary and Manager. Mr. Geo. R. Stetson assumes the rank of President and General Manager, and Mr. Chas. R. Price was appointed Treasurer.

AT a special meeting of the Westinghouse Electric Company, held in Pittsburgh, about a fortnight ago, it was decided to change the name of the concern to that of the Westinghouse Electric and Manufacturing Company, and to double the capital stock, which means an increase to $10,000,000. The statement of the Company's affairs submitted showed that it was indebted to Mr. Westinghouse for cash advanced to the amount of $1,241,705.42. He, however, agreed to take stock for this at the rate of $40 for each $50 share. Of the new stock issue $3,000,000 may be issued by the Directors from time to time as in their judgment may be deemed best, the issue of the remaining $2,000,000 to be subject to the approval of a special meeting of the stockholders called for that purpose. It is proposed to issue forthwith to each stockholder of record on this date an assignable right to subscribe on or before August 1, 1890, for one-half share of stock for each share now standing in his name on the books of the Company at $40 per share, this price being determined by a distribution or an allowance from the surplus earnings. Of this price, one-quarter is payable on each of the following dates: Aug. 1, Sept. 1, Oct. 1, and Nov. 1. The statement was made that the Company now controls 633 patents relating to electric lighting and power, and has now pending over 200 applications for patents for inventions necessary or desirable to the manufacture and operation of the latest forms of apparatus. The report for 1889 states that the sales of the Company and its leased companies during the year amounted to $4,362,115.22, yielding a net profit of $729,807.87.

A SINGLE-LIFT HOLDER (82 ft. in diameter by 22 ft. deep) has just been completed at the Victoria (British Columbia) gas works.

AT a meeting of the Chicago Council Committee on Gas, Oil, and Electric Lights, it was resolved to recommend for passage, without amendment, an ordinance permitting the Independent Gas Company to construct and operate a gas works in the "Windy City." This action is all the more to be wondered at when it is borne in mind that the introducer of the ordinance (Ald. McKnight, at the session held June 2) said he then knew nothing about the men who were behind the scheme, and he affirms that his knowledge about them now is just as limited as it was in the first week in June. The substance of the provisions of the ordinance is appended:

1. That the Company shall have the right to construct, maintain and operate gas works within the city of Chicago, together with the right of way along, upon and under all the avenues, streets, alleys and public places in said city for the purpose of placing, operating, repairing and maintaining a line or lines of gas mains and pipes and all necessary feeders and service pipes in connection therewith for lighting and fuel purposes.

2. That the gas be not charged for at more than $1 per 1,000 cubic feet for gas for illuminating purposes, nor more than 50 cents per 1,000 cubic feet for gas used for fuel purposes, with a rebate of 10 per cent. on said above prices in case of payment before the 12th day of the month.

3. That the Company shall pay to the city the sum of $25,000 per annum for the rights and privileges granted under this ordinance, in the manner following—viz.: When said Company shall commence the distribution of gas in the West Division of the city of Chicago then it shall pay the sum of $10,000 per annum, and that when said Company shall commence the distribution of gas within the South Division of the city then said Company shall pay an additional $10,000 per annum, and when said Company shall commence the distribution of gas in the North Division of the city then it shall pay an additional sum of $5,000 per annum, which payments shall be made in semi-annual payments commencing from the date of distribution of gas in said several divisions of the city as herein stated.

Another section provides that the city after the lapse of 20 years may purchase the plant of the Company, at an appraised valuation.

THE Lake Shore Foundry Company (Cleveland, O.) recently secured an award, under its tender to the water supply department of Chicago, to furnish the latter with 10,000 lengths of 6-inch cast iron water pipe, at the rate of $21.95 per ton.

IT is said that a permanent and durable joint can be made between rough cast iron surfaces by the use of mineral asbestos mixed with sufficient white lead to make a very stiff putty. This will resist heat of great intensity, and is unaffected by steam or water.

POSTMASTER ASHLEY (Troy, N. Y.) is our authority for the statement that the post offices at Troy and Lansingburgh will hereafter be lighted by gas. The electric lighting service heretofore employed was at once insufficient and high-priced.

A SUIT brought by W. P. Fiero to compel Judge Jno. J. Gorman, J. W. Shepard, Henry A. Bradley, and Jas. Fitzpatrick, officers of the Hydrocarbon Gas and Fuel Company, of New York, to account for their management of the Company, came up before Judge Cullen, a few days ago in the Supreme Court, on a motion to compel the plaintiff to accept an answer from L. C. Waehner as counsel. The answer had been returned by Fiero on the ground that Waehner was not the Company's attorney. A motion was also made to change the venue to New York County. On both motions decision was reserved. In his complaint Fiero alleges that Gorman, Bradley and Shepard voted themselves salaries of $6,000, $4,000, and $6,000 respectively, and later on increased them to $12,000, $10,000, and $12,000, the money to be paid out of the earnings of the Company. The receipts that year were only $13,000, but, Fiero says, Gorman drew $3,000, Bradley $2,000, and Shepard $3,000. Later, he asserts, they formed the Bradley and Western Gas and Fuel Company, with a capital of $125,000, and each man took $25,000 worth of stock, the remaining $50,000 being allotted to the Hydrocarbon Company. Not a cent was paid for any of this stock, it is alleged. Fiero further asserts that Gorman and Shepard have removed everything from the Company's offices, and locked the rooms, claiming that the Company is bankrupt and owes them $68,000 for unpaid salaries. Judge Gorman and Shepard put in a general denial as their answer, but Bradley admits that the charges are true. He sets up in extenuation that he was "a poor inventor, ignorant of the forms of law," and hence "at the mercy" of Gorman and Shepard.

IT is said that the Thomson-Houston Company has purchased the plant and franchises of the Middleboro (Mass.) Gas and Electric Company.

AT the annual meeting of the Oswego (N. Y.) Gas Company the following officers were chosen: President, Jas. Dowdle; Vice-President, H. S. Wright; Secretary, Wm. L. Welsh; Treasurer, R. G. Post; Directors, T. S. Mott, H. G. Ludlow, Wm. Cartwright, T. Kingsford, J. M. Casler, H. S. Wright, R. G. Post, H. D. McCaffrey and James Dowdle.

ON the same day the Oswego Home Electric Light Company selected its officers, in the persons of: R. G. Post, President; T. Kingsford, Vice-President; W. L. Welsh, Secretary; R. G. Post, Treasurer; T. S. Mott, Wm. Cartwright, T. Kingsford, R. S. Post and James Dowdle, Directors. Comparison of the two lists proves that the interests of these corporations are not likely to conflict.

WE are in receipt (under date of the 14th inst.) of the following letter, from Mr. B. F. Harding, Treasurer and Superintendent of the Bridgeton (N. J.) Gas Light Company:

"In accordance with the notice formally given in the local papers the annual meeting was held at the appointed time, and the following gentlemen were elected Directors of the Company for the ensuing year: Jonathan Elmer, Daniel Elmer, Chester J. Buck, H. W. Elmer and Wm. C. Mulford. At the Directors' meeting Jonathan Elmer was elected President of the Board, and Wm. C. Mulford, Secretary and Auditor, the present incumbent holding over as Superintendent and Treasurer. Notwithstanding the opposition of electric lights and other modes of artificial lighting as well, we are a little more than holding our own, they only taking about what would be our legitimate growth. During the 17 years record of the present management of the Company our business has about tripled, without any increase in our capital stock, the additions and improvements in plant having all been paid for out of current earnings, and the stockholders are entirely satisfied with the returns made to them. At the beginning of the period named $4 per 1,000 cubic feet was charged, but now (and for three years past) the charge to ordinary consumers has been $1.50, while large consumers get their supply at $1.20. Our profits *now* are greater than when the high rate was in vogue. The Directors ordered that a good supply of gas stoves be kept in stock so that no delay would be occasioned in filling consumers' orders for same."

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CITY COUNSELOR YEAGER, of Kansas City, Mo., has, in accordance with instructions from the special committee of the lower branch of the city government appointed to investigate the question of public lighting, rendered an opinion that the contract held by F. K. Hoover for lighting gasoline lamps in certain sections of the city is terminable on 30 days' notice. Hoover held that the agreement with him bound the city for a period of years, and in this belief was exacting the sum of $2.25 per month for each lamp maintained. He certainly did have a good thing of it at the rate specified.

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The following dividends were distributed during June on gas companies' shares with home offices in San Francisco, Cal.:

| Name of Company. | Dividend rate per Share. | Amount. |
|---|---|---|
| Oakland Gas | .20 | $6,000 |
| Pacific Lighting | .50 | 10,000 |
| Pacific Gas Improvement | .40 | 12,000 |
| San Diego Gas and Electric | .25 | 1,250 |
| San Francisco Gas | 30 | 30,000 |
| Stockton Gas | 25 | 1,250 |
| Total disbursed | | $60,500 |

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THE Crewe (Va.) Land and Improvement Company has been incorporated with a capital of $1 0,000. Objects; to construct water works, electric light plants and gas works.

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THE Chesapeake & Ohio Company's vestibuled train, known as the "Fast Flying Virginian," which plies between New York and Cincinnati, is composed of 6 cars, which are lighted by 118 incandescent electric lamps of 16-candle power each. The lamps are thus apportioned: 30 lamps each in the two Pullman sleepers, 16 in the day coaches, 13 in the combination car, 26 in the dining car and 3 in the baggage car. The light gives fairly good satisfaction—the train has been running for several months—but this service is only obtained at a very high cost. For instance, up to May 1st (embracing a period of 5 months in the determination) the average cost for maintaining and renewals was $1.10 per lamp per month. The system under which the current is supplied is a combination of dynamo and storage battery.

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THE meter companies throughout the country report a most satisfactory increase in the volume of trade. A feature is that the orders for new meters show a greater percentage than ever in favor of the smaller sizes—that is, between the three and five-light descriptions.

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NEGOTIATIONS are said to be underway in the matter of consolidating the business of the Citizens Gas Light Company and the Peoples Electric Light and Power Company, of Reading, Mass.

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CONTRACTOR A. J. BEATON, is putting down about 700 feet of mains for the New Britain (Conn.) Gas Company.

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THE Clinton (Mass.) Gas Light Company will erect its electric lighting station on a plot of ground lying between the B. & M. R. R. tracks and Parker street, west.

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THE stock of the Citizens Gas Light Company, of Quincy, Mass., is to be increased by an issue of 670 shares, which will be offered at auction to-day.

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THE annual meeting of the Laconia (N. H.) Gas Company was held a fortnight ago, when the former staff of officers was re-elected without opposition. A resolution was adopted ordering a reduction in gas rates of $1 per 1,000, the same to take effect on Aug. 1. If we mistake not, this brings the gross charge down to $3.50.

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ABOUT a fortnight ago we noted that the electric plant of the Concord (N. H.) Gas and Electric Light Company was damaged by fire. It seems that the Fire Department's services were of an exceptionally vigorous and successful sort in quelling the conflagration, as the following action taken by the Gas Company goes to prove. At a special meeting of the Directors of the Company the following resolution was passed: "Voted, That in recognition of the efficient and valuable services of the Concord Fire Department during the recent fire which endangered the property of this corporation, the sum of $100 be contributed to the funds of the Concord Firemen's Relief Association, and that the Treasurer be authorized to make payment of the same."

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WE are indebted to "Observer" for the following, from the Springfield (Mass.) *Republican*, of recent date: "It appears that the Executive Council, on its recent trip to North Adams to look at the Southern Vermont Railroad, passed upon the nomination of Gas Commissioner Rowell, and the nomination was rejected. Of course, the Councilors are close about stating how the vote stood, but any careful betting man would be reasonably safe in supposing that 5 to 4 represents the facts. It is difficult for anybody to get up enthusiasm for Mr. Rowell, who was originally appointed on political grounds, and whose partner in the Lowell *Courier*, Mr. Marden, is Treasurer of the State. But the fact that he has since learned something about gas makes him a more fit man than one who has his experience yet to acquire. The theory on which the opposing Councilors acted seems to have been that, as Commissioner Coffin lives in Middlesex county, which is also the home of Mr. Rowell, it wou'd be fair to plant this official in some other part of the State. As Commissioner Barker lives in Worcester county, the Western Massachusetts candidates say the third Commissioner ought to come from this section. The man having the most support is ex-Senator Towne, of Orange, a competent business man who could and would give his whole time to the State; while the friends of Alvan Barrus, of Goshen, also an ex-Senator, are pushing him for the place. In all this there is a misconception of the duty of Governor Brackett. The idea that he should seek the man whose acquaintance with the manufacture of gas best fits him to guard the public interests has quite been lost sight of. But if the Governor is going to act on other grounds, the men named from Franklin and Hampshire counties are as good as Mr. Rowell was in the first instance, and even more desirable from the fact that they are not so burdened with private business interests, and so could give more time to the work of the Gas Commission. Senator M. P. Palmer, of Groton, is also 'mentioned,' but the name of Senator Fassett, of Great Barrington, is no longer heard. The Council will meet again in Boston next Thursday, but it is not certain that the Governor will then give them another nomination to consider."

---

## What Ammonia Can Do.

A little ammonia in tepid water will soften and cleanse the skin.

Spirits of ammonia will often relieve a severe headache.

Door plates should be cleaned by rubbing with a cloth wet in ammonia and water.

If the color has been taken out of silks by fruit stains, ammonia will usually restore the color.

To brighten carpets, wipe them with warm water in which has been poured a few drops of ammonia.

One or two tablespoonfuls of ammonia added to a pail of water will clean windows better than soap.

A few drops in a cupful of warm water, applied carefully, will remove spots from paintings and chromos.

Grease spots may be taken out with weak ammonia in water; lay soft white paper over and iron with a hot iron.

Keep nickel, silver ornaments, and mounts bright by rubbing with woolen cloth saturated with spirits of ammonia.

When acid of any kind gets on clothing, spirits of ammonia will kill it. Apply chloroform to restore the color.

Ammonia applied two or three times, on a fresh cold sore, will kill it. It will drive it away if used when the cold sore is first felt.

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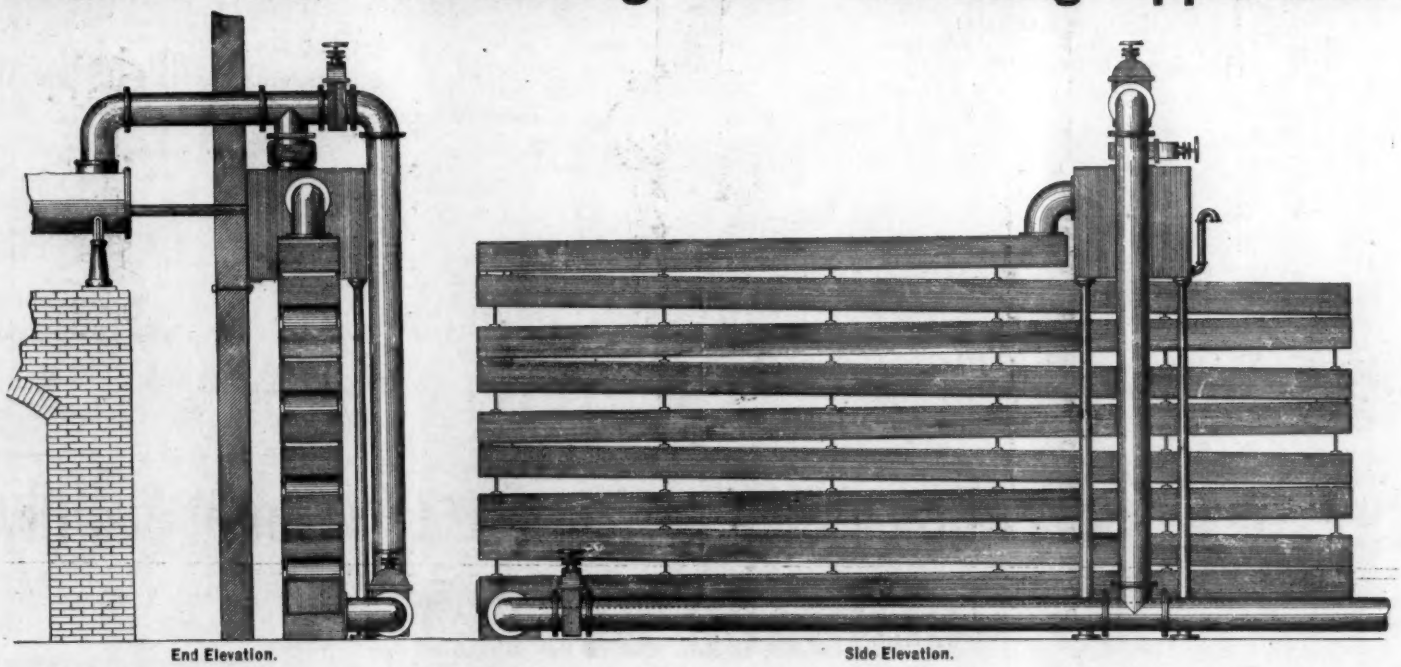

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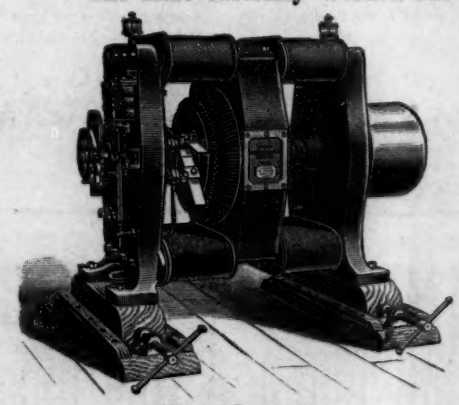

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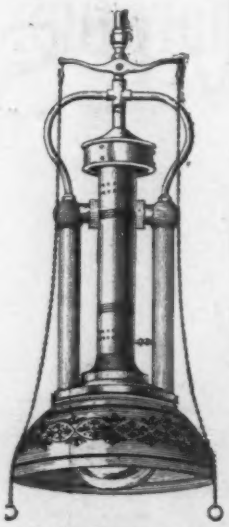

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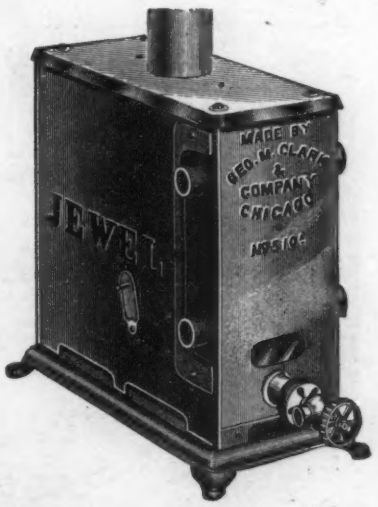


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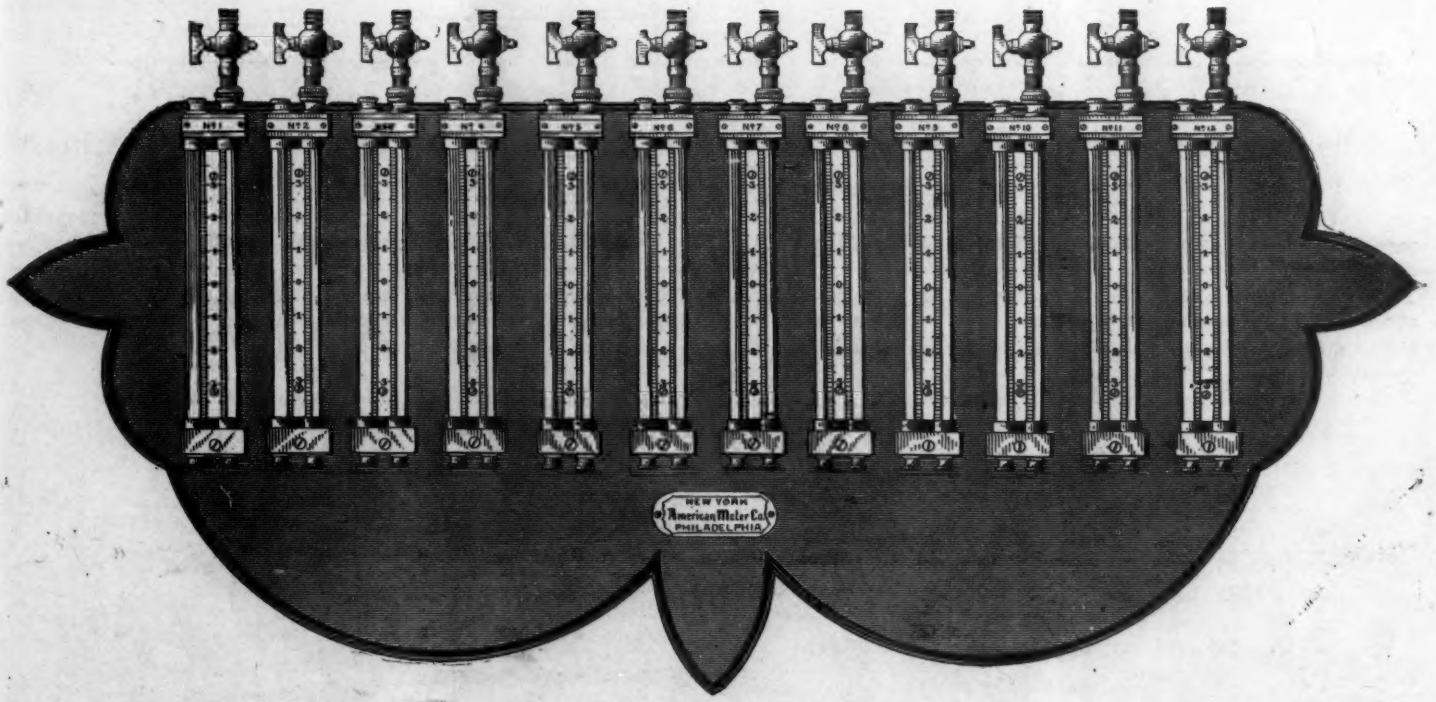


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The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fitted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractor has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge. Also to G. E. Stevenson, Peterborough Gas Works; B. Green, Mitcham and Wimbledon Gas Works; W. H. Smith, Bedford Gas Works; F. Linging, Norwich Gas Works; J. T. Browning, Colchester Gas Works; S. B. Darwin, Portsmouth Gas Works; J. McCrae, Dundee Gas Works; W. J. Wells, Stamford Gas Works; J. M. Darwin, Longton Gas Works; J. Paterson, Warrington Gas Works; and J. Coulter, of the Dundalk Gas Works. All of the foregoing gas works are located in Great Britain.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus, and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

I have taken the Agency for the United States for this apparatus, and am now prepared to make contracts to erect it on the premises of any Gas Company. It would be manufactured in the following sizes:

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| No. 3, | " | " | 250,000 | " | " | " | 5 | " | " | " |
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| No. 5, | " | " | 750,000 | " | " | " | 7 | " | " | |
| No. 6, | " | " | 1,000,000 | " | " | " | 8 | " | " | " |
| No. 7, | " | " | 1,250,000 | " | " | " | 9 | " | " | " |
| No. 8, | " | " | 1,500,000 | " | " | " | 10 | " | " | " |
| No. 9, | " | " | 2,000,000 | " | " | " | 12 | " | " | " |
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This Tar Extractor will perform its work with about one-fourth the usual back-pressure heretofore required. It is simple in construction, and can be supplied at a very reasonable price—less than any other ever before introduced. Satisfactory results will be guaranteed in every instance.

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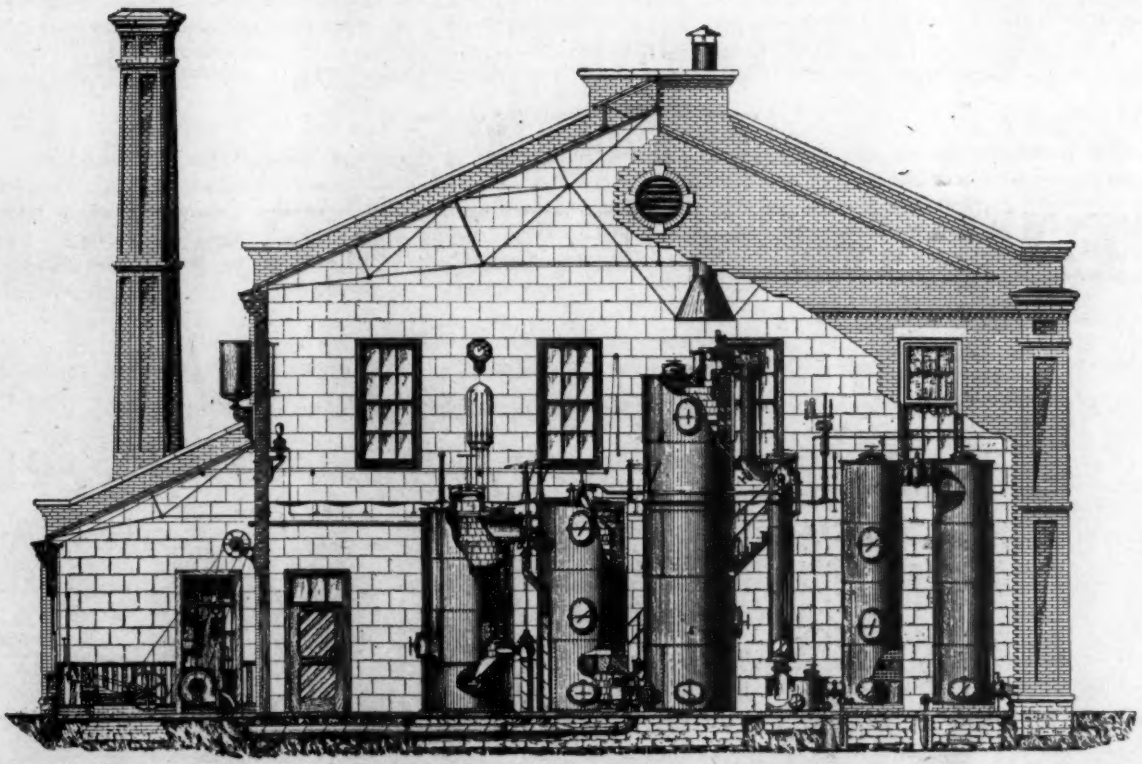

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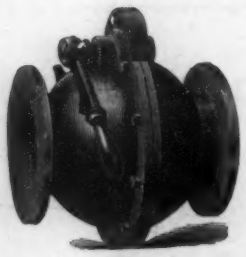

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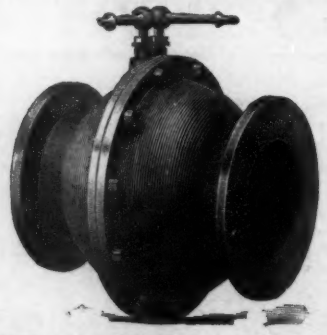

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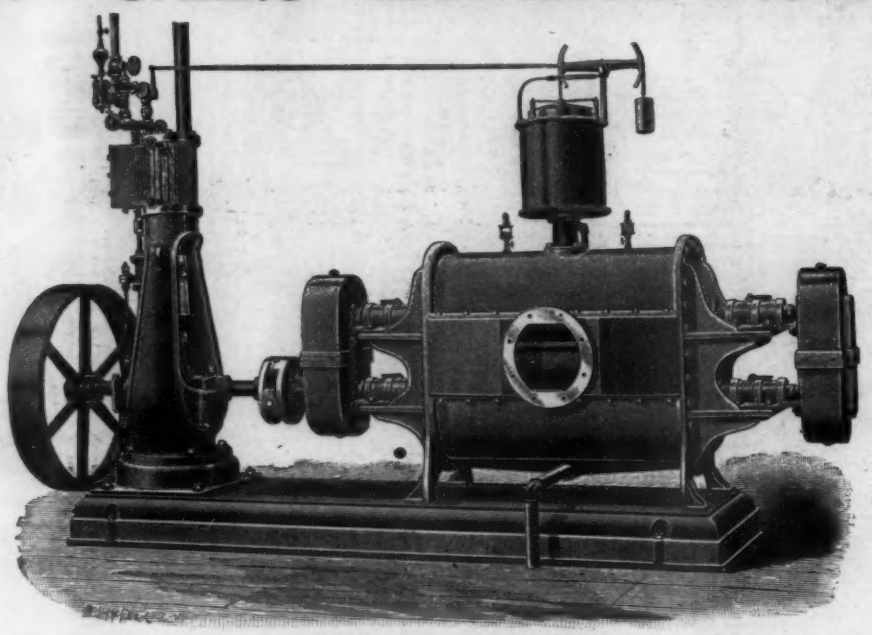

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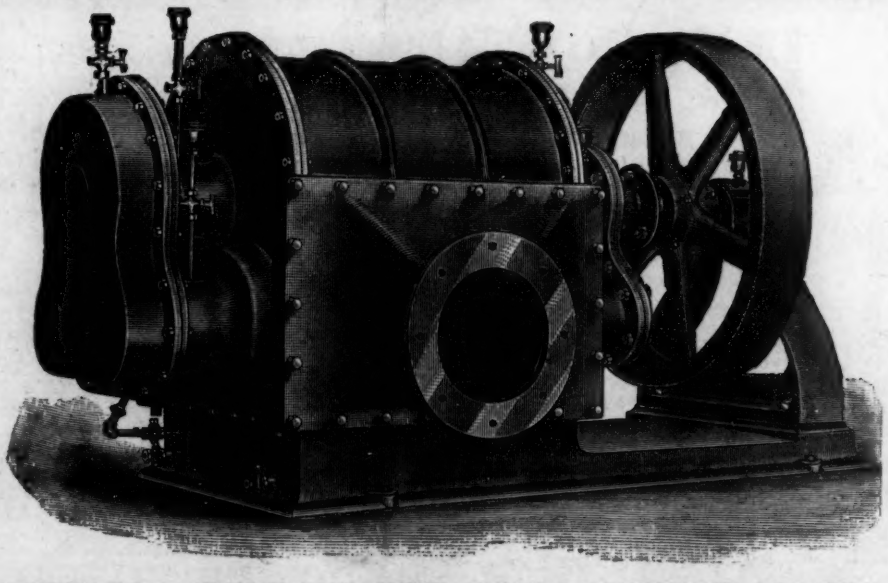

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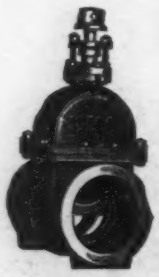

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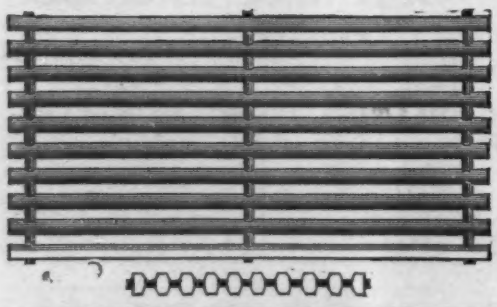

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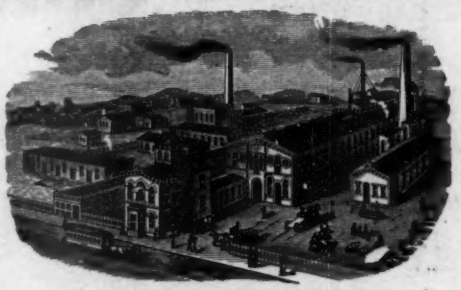

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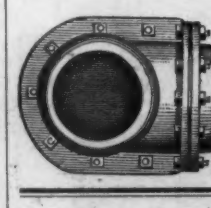

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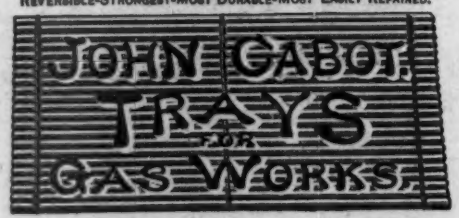


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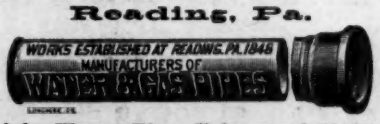


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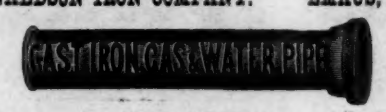


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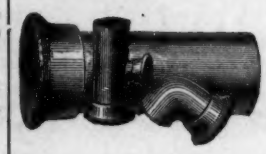

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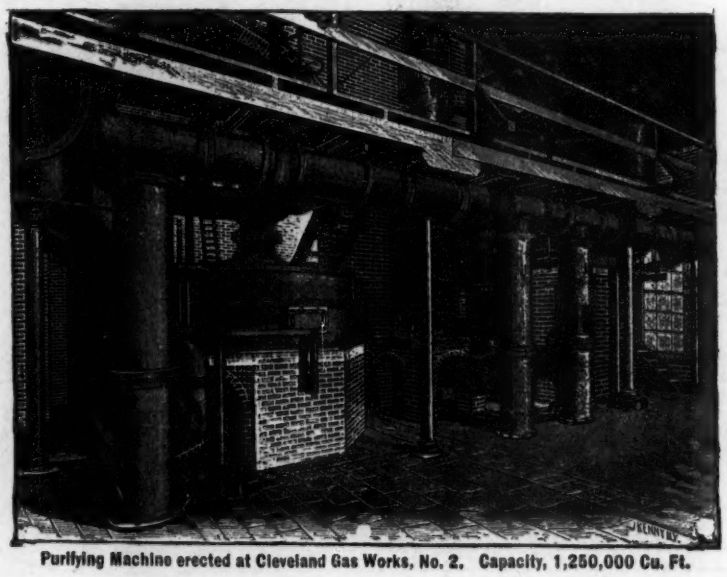

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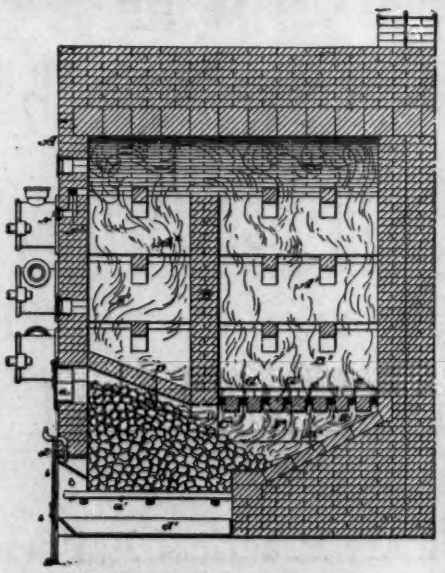

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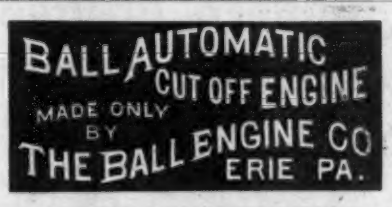


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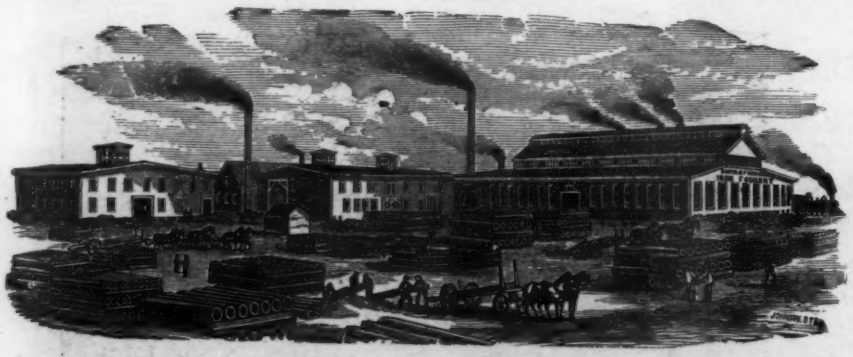

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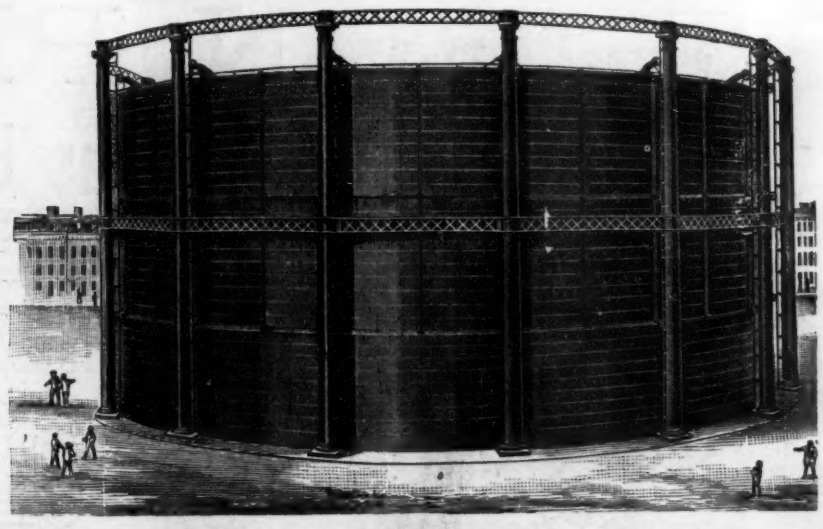

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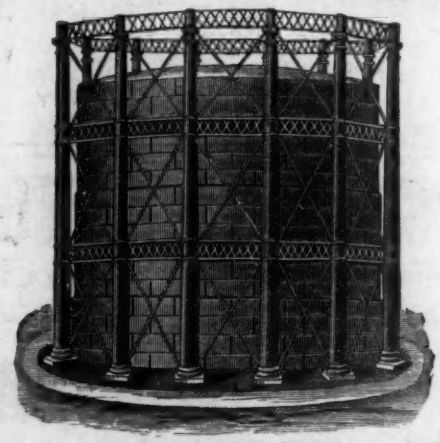

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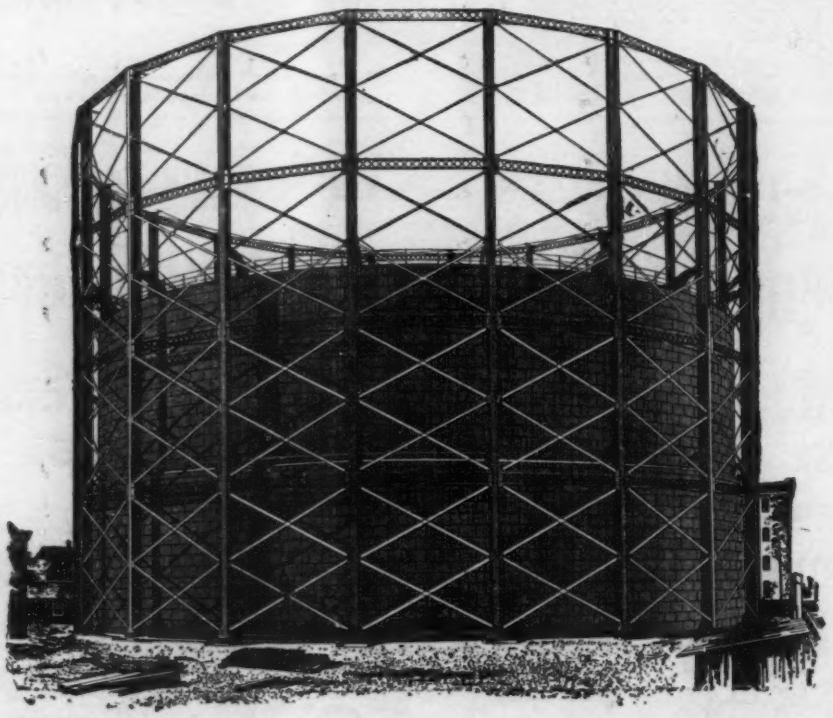

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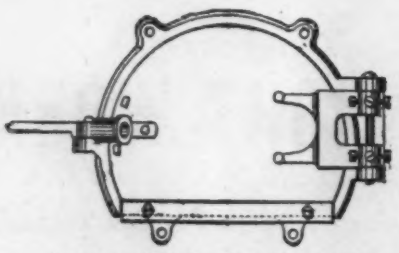

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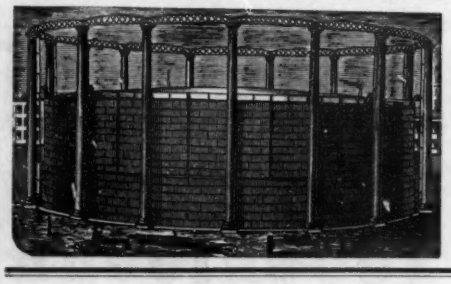
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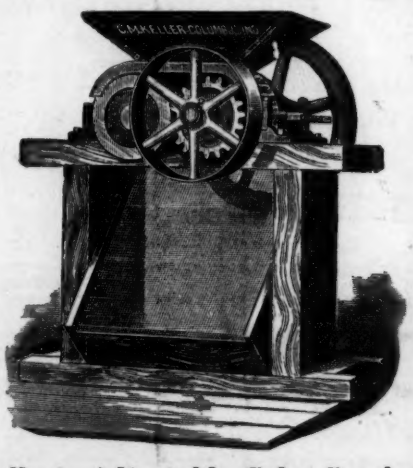

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DRY CENTER VALVES. CRESSON GAS REGULATORS. AMMONIA TEST METERS.
GOVERNORS FOR GAS WORKS. MARSLAND WATER METERS. BAR & JET PHOTOMETERS.

Manufactories: 512 West 22d St., N. Y. Arch & 22d Sts., Phila.

GAS STOVES.
SUGG'S "STANDARD" ARGAND BURNERS,
SUGG'S ILLUMINATING POWER METER,
Wet Meters, with Lizar's "Invariable Measuring" Drum.

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## HELME & McILHENNY,

(Established 1848.)

## GAS METER MANUFACTURERS,

Nos. 1339 to 1349 Cherry Street, Philadelphia, Pa.,

WET AND DRY GAS METERS. STATION METERS, EXPERIMENTAL METERS, METER PROVERS,

Center Seals, Pressure Registers, Governors, Indicators, Photometers, and all other kinds of Apparatus for use in Gas Works.

FOULIS' PATENT STATION AND DISTRICT GOVERNORS.

REPAIRING DEPARTMENT.—We employ a special force of skilled workmen repairing meters of all makers.

WM. WALLACE GOODWIN, President and Treasurer. E. STEIN, Vice-President. H. B. GOODWIN, Secretary and Superintendent.

# THE GOODWIN GAS STOVE AND METER CO.,

Successors to W. W. GOODWIN & CO.

1012, 1014 and 1016 Filbert St., Phila., Pa. 113 Chambers St., New York City. 76 Dearborn, St., Chicago, Ills.

WALDO BROTHERS, Agents, 88 Water Streets, Boston, Mass.

MANUFACTURERS OF

## DRY AND WET GAS METERS,

Station Meters (square, cylindrical, or in staves), Glazed Meters, King's and Sugg's Experimental Meters, Lamp Post Meters, etc., etc. Meter Provers (sizes 2, 5, and 10 feet), Pressure Gauges of all kinds, Pressure Registers, Pressure and Vacuum Registers, Pressure Indicators (sizes 4, 6, and 9 inch), King's Pressure and Vacuum Gauges, Dry and Wet Center Seals, Dry and Wet Governors, Exhauster Governors, Photometers of all descriptions. Letheby's Sulphur and Ammonia Test Apparatus complete. Also, Testing and Chemical Apparatus of all kinds, and of the most perfect description, for all purposes relating to Gas.

Manufacturers of the "SUN DIAL" GAS STOVES, for Cooking and Heating.

Goodwin's Improved Lowe's Jet Photometer. Agents for Bray's Patent Gas Burners and Lanterns.

Special attention to Repairs of Meters and all Apparatus connected with the business. All work guaranteed first-class in every particular. Orders filled promptly.

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# GAS METER MANUFACTURERS.

(Established 1854.)

51 Lancaster St., Albany, N. Y. 34 & 36 West Monroe St., Chicago, Ill.

STATION METERS, EXPERIMENTAL METERS, METER PROVERS, PRESSURE & VACUUM REGISTERS, PRESSURE GAUGES, ETC.

Also STAR GAS STOVES, RANGES, and HEATING STOVES.

We use only the very best materials, and employ the most skilled labor, and by our long experience (36 years) and personal supervision of every detail, we feel justified in assuring the public that our goods will give perfect satisfaction. Every Meter emanating from our establishment will bear the State Inspector's Badge, and will be fully warranted by us. Our Annual and Calendar will be sent to Gas Companies upon application.

WM. WALLACE GOODWIN, President. E. STEIN, Vice-President. H. B. GOODWIN, Sec. & Supt. G. B. EDWARDS, Mang'r, New York. S. S. STRATTON, Mang'r, Chicago.

# THE GOODWIN GAS STOVE AND METER CO.,

1012-18 Filbert St., Phila., 113 Chambers St., N. Y., 76 Dearborn St., Chicago.

Agents, WALDO BROTHERS, 88 Water Street, Boston.

SOLE MANUFACTURERS OF THE

## "SUN DIAL" GAS STOVES,

**The Most Economical, Efficient, and Durable Gas Stove Made.**

GAS COOKING STOVE, No. 8 C.

SIZE.

| Stove. | Oven. | Roaster. | Top. | Length over Extension Shelves, |
|---|---|---|---|---|
| 37 in. high. | 12 in. high. | 12 in. high. | 24 in. long. | 36 in. |
| 20 in. wide. | 17½ in. wide. | 18 in. wide. | 21 in. wide. | |
| | 12 in. deep. | 13 in. deep. | | |

This Stove has four burners on top, and double oven burner.

Consumption of gas with all burners in use, 42 feet per hour, at 1 inch pressure.

The top is made in sections, so that a greater variety of cooking utensils may be used. By lifting out the covers and crosspieces and putting in a suitable forked ring, which is sent with each stove, a wash boiler or other large utensil may be set over two burners. Our **No. 87 GRIDDLE** also fits in the same position. The roasting oven is provided with a cast-iron door.

***All Fittings are Nickel-Plated.***

GAS COOKING STOVE, No. 7 B.

SIZE.

| Stove. | Oven. | Roaster. | Top. | Length over Extension Shelves, |
|---|---|---|---|---|
| 31 in. high. | 9½ in. high. | 10 in. high. | 21 in. long. | 32 in. |
| 17 in. wide. | 14½ in. wide. | 15 in. wide. | 16 in. wide. | |
| | 12 in. deep. | 13 in. deep. | | |

This Stove has three boiling burners in the Top or Hot Plate, and one single oven burner.

This cut represents our New Style Cooking Stove. As will be seen, it has an ornamented cast-iron Base and Front, and extension shelves. The Oven Burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent). The ovens are of greater capacity than those of the old style. The Top, in conjunction with the Outlet Pipe, is designed to carry off all the products of combustion, if desired, but they are also supplied with a loose ring which converts it into an ordinary open top stove.

The consumption of this Stove is 35 cubic feet per hour at 1 inch pressure, with all Burners in use.

***All Fittings are Nickel-Plated.***

"RADIANT" BOILING STOVE, WITH REGENERATIVE BURNER.

Size, 6¼ inches diameter, 3 inches high. Consumption, 6 feet per hour at 1 in. pressure.

HOT PLATE, No. 111.

Size, 36 in. long, 12 in. wide, with three double burners, 6 taps.

Consumption, with all burners in use, 36 cubic feet per hour, with 1 in. pressure.

¼ in. supply pipe should be used where the pressure is 1 in. or over.